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A UNIVERSITY OF MARYLAND PUBLICATION

VOL. 5

March 5, 1953

NO. 25

GRADUATE SCHOOL ANNOUNCEMENTS



1953-1954 Issue

UNIVERSITY OF MARYLAND
COLLEGE PARK, MARYLAND



IMPORTANT

THE provisions of this publication are not to be regarded as an irrevocable contract between the student and the University of Maryland. The University reserves the right to change any provision or requirement at any time within the student's term of residence. The University further reserves the right at any time, to ask a student to withdraw when it considers such action to be in the best interests of the University.

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For information in reference to the University grounds, buildings, equipment, library facilities, requirements in American Civilization, definition of resident and non-resident, regulation of studies, degrees and certificates, transcripts of records, student health and welfare, living arrangements in the dormitories, off-campus housing, meals, University Counseling Service, scholarships and student aid, athletics and recreation, student government, honors and awards, religious denominational clubs, fraternities, societies and special clubs, the University band, student publications, University Post Office and Supply Store, write to the Director of Publications for the General Information issue of the Catalog.

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VOL. 5

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A UNIVERSITY OF MARYLAND PUBLICATION

is published four times in January, February, March and April; three times in May; once in June and July; twice in August, September, October and November; and three times in December.

Re-entered at the Post Office in College Park, Maryland, as second class mail matter under the Act of Congress of August 24, 1912. Harvey L. Miller, Director of Publications, University of Maryland.

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AND
MARYLAND STATE BOARD OF AGRICULTURE

	<i>Term Expires</i>
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EDMUND S. BURKE, Cumberland	1959
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The State law provides that the Board of Regents of the University of Maryland shall constitute the Maryland State Board of Agriculture.

A regular meeting of the Board is held the last Friday in each month, except during the months of July and August.

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DR. ADOLPH E. ZUCKER, Professor of Foreign Languages, Chairman, The Division of Humanities
DR. WILBERT J. HUFF, Professor of Chemical Engineering, Chairman, The Division of Physical Sciences
DR. HAROLD C. HOFFSOMMER, Professor of Sociology, Chairman, The Division of Social Sciences

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Religious Life Committee

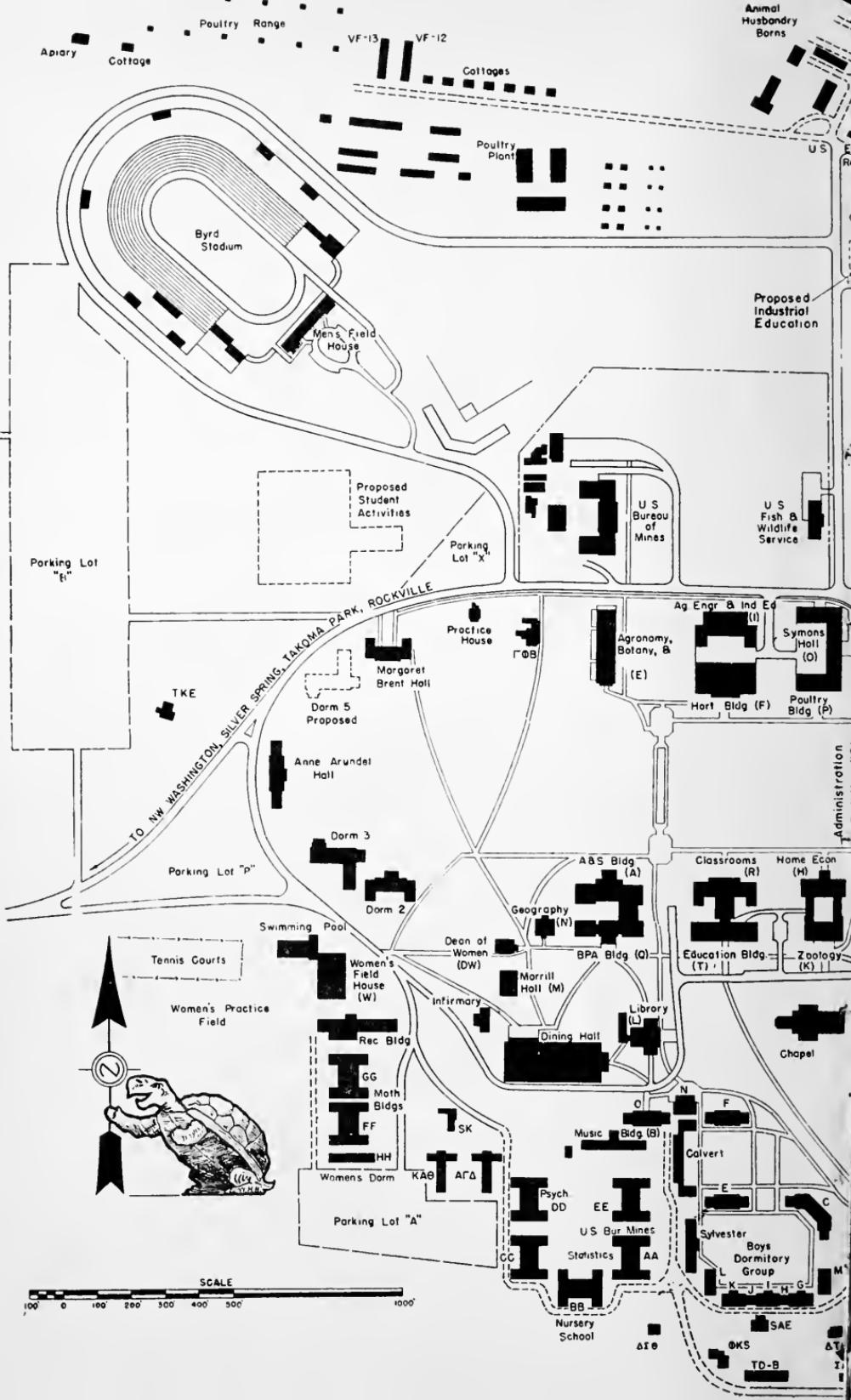
Chairman Shreeve; Messrs. Daker, Gewehr, Hamilton, Randall, Reid, Scott, White; Mmes. Bryan, McNaughton.

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Chairman Cotterman; Messrs. Eppley, Long, Reid, Steinmeyer; Mmes. Mount, Stamp.

Student Life

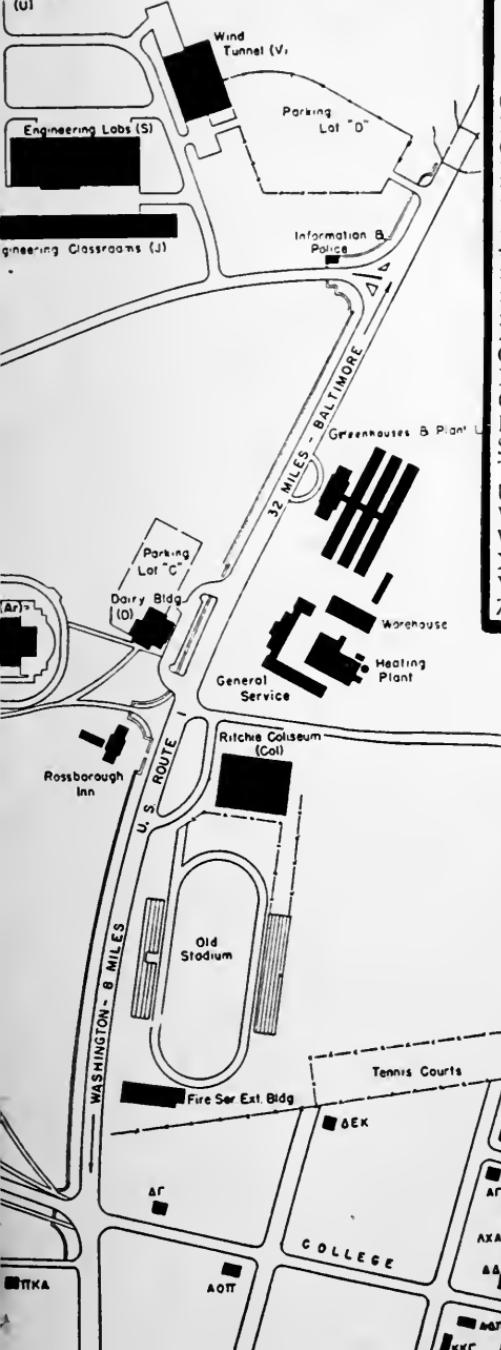
Chairman Reid; Messrs. Allen, Eppley, James, Kramer, Peck, Quigley, Strausbaugh, Tatum, White; Mmes. Binns, Harman, Preinkert, Stamp and the President of the Student Government Association and the President of the Men's League and the President of the Women's League.



University of Maryland



COLLEGE PARK CAMPUS 1953



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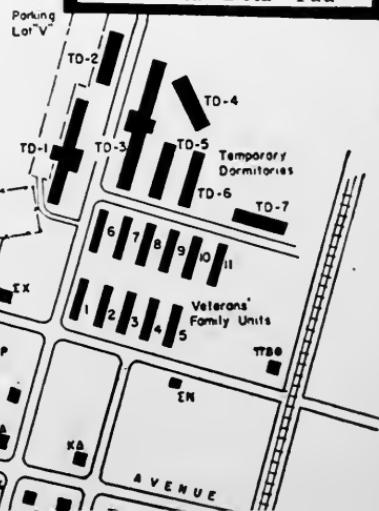
A	Arts and Sciences
Ar	Armory
B	Music
BB	Chemistry Annex
IB	Administration
C	Chemistry (new)
Col	Coliseum
D	Dairy
DD	Psychology
DW	Dean of Women
E	Agronomy, Botany, Physics
F	Horticulture
G	Gymnasium
FF	Mathematics
GG	Mathematics
H	Home Economics
HH	Seminar
I	Agric., Eng. and Industrial Education
J	Engr. Classroom Bldg.
K	Zoology
L	Library
M	Morrill Hall
N	Geography
O	Symons Hall (Agric.)
P	Poultry
Q	Business and Public Administration
R	Classroom Building
S	Eng. Lab. Building
T	Education
U	Chem. Engineering
V	Wind Tunnel
W	Women's Field House
X	Animal Husbandry Pavilion
Y	Mathematics
Z	Physics

Sororities Not Shown—

Alpha Chi Omega
Alpha Xi Delta

Fraternities Not Shown

Alpha Epsilon Pi
Pi Alpha
Phi Kappa Gamma
Tau Epsilon Phi
Zeta Beta Tau



1953

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1954

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1955

JULY 1953							JANUARY 1954							JULY 1954							JANUARY 1955							
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DECEMBER							JUNE							DECEMBER							JUNE							
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27	28	29	30	31	27	28	29	30	26	27	28	29	30	31	..	26	27	28	29	30	

CALENDAR 1953-1954

College Park

First Semester

1953

September 16-18	Wednesday-Friday	Registration, first semester
September 21	Monday	Instruction begins
October 15	Thursday	Convocation, faculty and students
November 25	Wednesday after last class	Thanksgiving recess begins
November 30	Monday, 8 a.m.	Thanksgiving recess ends
December 19	Saturday after last class	Christmas recess begins

1954

January 4	Monday, 8 a.m.	Christmas recess ends
January 20	Wednesday	Charter Day
January 21-28	Thursday-Thursday, inc.	First semester examinations

Second Semester

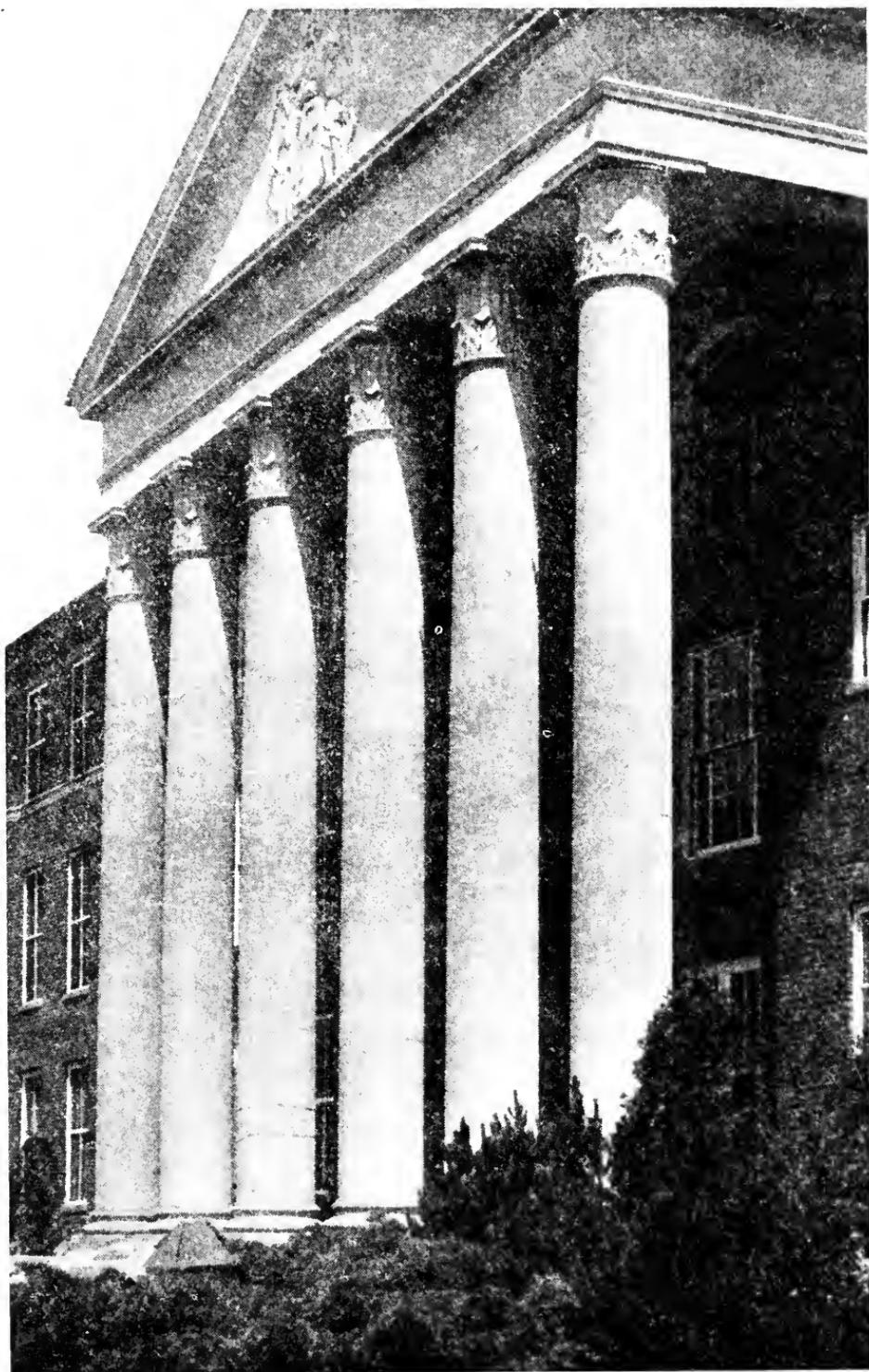
February 3-5	Wednesday-Friday	Registration, second semester
February 8	Monday	Instruction begins
February 22	Monday	Washington's birthday, holiday
March 25	Thursday	Maryland Day
April 15	Thursday after last class	Easter recess begins
April 20	Tuesday, 8 a.m.	Easter recess ends
May 13	Thursday	Military Day
May 27-June 4	Thursday-Friday, inc.	Second Semester examinations
May 30	Sunday	Baccalaureate exercises
May 31	Monday	Memorial Day holiday
June 5	Saturday	Commencement exercises

Summer Session, 1954

June 21	Monday	Registration, summer session
June 22	Tuesday	Summer session begins
July 30	Friday	Summer session ends

Short Courses

June 14-19	Monday-Saturday	Rural Women's Short Course
August 2-7	Monday-Saturday	4-H Club Week
September 7-10	Tuesday-Friday	Firemen's Short Course



Entrance to Graduate School

GRADUATE SCHOOL ANNOUNCEMENTS 1953-1954

THE GRADUATE COUNCIL

H. C. BYRD, LL.D., D. Sc., President of the University

RONALD BAMFORD, Ph.D., Dean of the Graduate School, Chairman

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HAROLD F. COTTERMAN, Ph.D., Professor of Agricultural Education

WILBUR DEVILBISS, Ed.D., Professor of Education

N. L. DRAKE, Ph.D., Professor of Organic Chemistry

NOEL E. FOSS, Ph.D., Professor of Pharmacy (Baltimore)

I. C. HAUT, Ph.D., Professor of Horticulture

HAROLD C. HOFFSOMMER, Ph.D., Professor of Sociology

WILBERT J. HUFF, Ph.D., D.Sc., Professor of Chemical Engineering

M. MARIE MOUNT, M.A., Professor of Home and Institution Management

J. FREEMAN PYLE, Ph.D., Professor of Economics and Marketing

LEON P. SMITH, Ph.D., Professor of Foreign Languages

EDUARD UHLENHUTH, Ph.D., Professor of Gross Anatomy (Baltimore)

E. G. VANDEN BOSCHE, Ph.D., Professor of Biochemistry (Baltimore)

A. E. ZUCKER, Ph.D., Professor of Foreign Languages

GRADUATE SCHOOL SUPPLEMENT TO GENERAL CALENDAR**1953**

- October 6.....Tuesday.....Modern language examination for Ph.D. requirement
- October 10.....Saturday.....Last day to file applications for admission to candidacy for Doctor's degrees on June 5, 1954 and Master's degrees on January 28, 1954
- December 5.....Saturday.....Last day to file applications for diplomas at the office of the Registrar for degrees on January 28, 1954

1954

- January 9.....Saturday.....Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on January 28, 1954
- February 9.....Tuesday.....Modern language examination for Ph.D. requirement
- February 20.....Saturday.....Last day to file applications for admission to candidacy for Master's degrees on June 5, 1954
- April 10.....Saturday.....Last day to file applications for diplomas at the office of the Registrar for degrees on June 5, 1954
- May 15.....Saturday.....Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on June 5, 1954
- June 1.....Tuesday.....Modern language examination for Ph.D. requirement
- June 7.....Monday.....Last day to file applications for admission candidacy at June meeting of the Graduate Council
- July 8.....Tuesday.....Last day to file applications for diplomas at the office of the Registrar for degrees on July 30, 1954
- July 12.....Saturday.....Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on July 30, 1954

GRADUATE SCHOOL

RONALD BAMFORD, Ph.D., *Dean*
LUCY A. LYNHAM, B.A., *Secretary to the Dean*

HISTORY AND ORGANIZATION

THE Graduate School was established in its present form in 1918 under the jurisdiction of the Graduate Council with the Dean of the Graduate School serving as chairman. It was created for the purpose of administering and developing programs of advanced study and research for graduate students in all branches of the university. Prior to the present organization some advanced degrees were awarded but they were under the jurisdiction of the individual departments subject to the supervision of the general faculty. Despite the large expansion of the graduate programs into new areas as the university has grown, the spirit and basis of each program is essentially that of individual study under competent supervision. At the present time over fifty departments are authorized to offer graduate programs leading to one or more of the advanced degrees awarded by the university.

The Graduate Council is made up of representatives of all branches of the university where active graduate programs are in progress. The members are appointed by the President of the University and are charged with the formulation of overall policies. The Graduate Council meets regularly in March, June and October to consider all matters relating to graduate work brought to its attention by the University Administration, the Graduate Faculty and the Dean of the Graduate School. It may also be called for special meetings throughout the year if urgent business must be transacted.

The Graduate Faculty is made up of those members of the faculties of the various colleges who give instruction in approved graduate courses. The direction of individual programs and theses is primarily assigned to senior members of the departmental staffs.

LOCATION

The office of the Graduate School is located on the second floor of the Education Building on the College Park campus. This campus is located in Prince Georges County on a large tract of rolling wooded land less than eight miles from Washington, D. C. and approximately thirty-two miles from Baltimore. It is served by excellent transportation regardless of whether private car, street car, railroad or bus is used.

The Baltimore campus of the university is located at the corner of Lombard and Greene Streets, and on this campus the various departments in the Schools of Medicine, Dentistry and Pharmacy offer their graduate programs.



GENERAL REGULATIONS ADMISSION

An applicant for admission to the Graduate School must hold a Bachelor's or a Master's degree from a college or university of recognized standing. The applicant shall furnish an official transcript of his collegiate record which for unconditional admission must show creditable completion of an adequate amount of undergraduate preparation for graduate work in his chosen field. Application for admission to the Graduate School should be made prior to dates of registration on blanks obtained from the office of the Dean.

After approval of the application a matriculation card, signed by the Dean, is issued to the student. This card permits one to register in the Graduate School. It is his certificate of membership in the Graduate School and should be retained by the student to present at each succeeding registration.

Admission to the Graduate School does not necessarily imply admission to candidacy for an advanced degree.

REGISTRATION

All students pursuing graduate work in the University, even though they are not candidates for higher degrees, are required to register in the Graduate School at the beginning of each session. *In no case will graduate credit be given unless the student matriculates and registers in the Graduate School.* This applies especially to those students who register through the College of Special and Continuation Studies at locations away from the campus.

The program of work for each session is arranged by the student with the major department and entered upon two course cards, which are signed first by the professor in charge of the student's major subject and then by the Dean of the Graduate School. One card is retained by the Dean. The student takes the other card, and in case of a new student, also the matriculation card, to the Registrar's office, where the registration is completed. Students will not be admitted to graduate courses until the Registrar has certified to the instructor that registration has been completed. Course cards may be obtained at the Registrar's office or at the Dean's office. The heads of departments usually keep a supply of these cards in their respective offices.

A time schedule, supplementing this catalog, is issued shortly before the beginning of each semester, showing the hours and location of class meetings. This schedule is available at the office of the Registrar.

GRADUATE COURSES

Graduate students must elect for credit in partial fulfillment of the requirements for higher degrees only courses designated *For Graduates or For Graduates and Advanced Graduates*. Students who are inadequately prepared for graduate work in their chosen fields or who lack prerequisites for minor courses may elect a limited number of courses numbered from 1 to 99 in the general catalogue, but

graduate credit will not be allowed for these courses. Courses that are audited are registered for in the same way as other courses, and the fees are the same.

PROGRAM OF WORK

The professor who is selected to direct a student's thesis work is the student's adviser in the formulation of a graduate program, including suitable minor work, which is arranged in cooperation with the instructors. To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions are limited to a program of fifteen credit hours per semester. If a student is preparing a theses during the minimum residence for the master's degree, the registration in graduate courses should not exceed twelve hours for the semester.

SUMMER SESSION

The University conducts a six-weeks summer session at College Park, with a comprehensive undergraduate and graduate program. The University publishes a separate bulletin giving full information on this summer session. This bulletin is available upon application to the Director of the Summer Session, University of Maryland, College Park.

GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

Graduate courses and opportunities for research are offered in the professional schools at Baltimore. Students pursuing graduate work in the professional schools must register in the Graduate School, and meet the same requirements and proceed in the same way, as do graduate students in other departments of the University.

OAK RIDGE INSTITUTE

The University is one of the sponsoring institutions of the Oak Ridge Institute of Nuclear Studies located at Oak Ridge, Tennessee. One of the features of this affiliation is the opportunity, in the appropriate fields, for graduate students to do their research problems and prepare their theses under a cooperative arrangement. Such opportunity is limited to those who have completed their course work on the campus, are working in a field where facilities are available, and generally are candidates for the doctoral degree. Successful applicants will receive Oak Ridge Graduate Fellowships with varying stipends depending upon their marital status and dependents. Detailed information is available in the Graduate School office.

GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

A senior of this University who has nearly completed the requirements for the graduate degree may, with the approval of his undergraduate dean, the Head of the department concerned, and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which may later be transferred for

graduate credit toward an advanced degree at this University, but the student must be within seven credit hours of completing his undergraduate work and the total of undergraduate and graduate courses must not exceed fifteen credits for the semester. Excess credits in the senior year cannot later be used for graduate credit unless such pre-arrangement is made. Seniors who wish to register for graduate credit should apply to the Dean of the Graduate School for information about procedure.

ADMISSION TO CANDIDACY FOR ADVANCED DEGREES

Application for admission to candidacy for the Master's and for the Doctor's degree is made on application blanks which are obtained at the office of the Dean of the Graduate School. These are filled out in duplicate by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. All applications for admission to candidacy must be approved by the Graduate Council.

Admission to candidacy in no case assures the student of a degree, but merely signifies he has met all the formal requirements and is considered by his instructors sufficiently prepared and able to pursue such graduate study and research as are demanded by the requirements of the degree sought. The candidate must show superior scholarship in graduate work already completed.

Application for admission to candidacy is made at the time stated in the sections dealing with the requirements for the degree sought.

REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

Advancement to Candidacy. Each prospective candidate for the Master's degree is required to make application for admission to candidacy not later than the date on the calendar for the semester in which the degree is sought. He must have completed at least twelve semester hours of graduate work at the University of Maryland. An average grade of "B" in all major and minor subjects is the minimum requirement.

Minimum Residence. A residence of at least two semesters, or equivalent, at this institution, is required.

Course Requirements. A minimum of twenty-four semester hours, exclusive of thesis and registration for research, with a minimum average grade of "B" in courses approved for graduate credit, is required for the degrees of Master of Arts and Master of Science. The student is also required to register for six semester hours for research and thesis work. The total number of credit hours required for the degree is thirty. If the student is inadequately prepared for the required graduate courses, either in the major or minor subjects, additional courses may be required to supplement the undergraduate work. Of the twenty-four hours required in graduate courses, not less than twelve hours and not more than sixteen semester hours must be earned in the major subject. The remaining credits must be outside the major subject and must

comprise a group of coherent courses intended to supplement and support the major work. Not less than one-half of the total required course credits for the degree, or a minimum of twelve, must be selected from courses numbered 200 or above. No credit for the degree of Master of Arts or Master of Science may be obtained for correspondence courses or those taken by examination. The entire course of study must constitute a unified program approved by the student's major adviser and by the Dean of the Graduate School.

Transfer of Credit. Credit not to exceed six semester hours, obtained at other recognized institutions, may be transferred and applied to the course requirements of the Master's degree, provided that the work was of graduate character, and provided that it is approved for inclusion in the student's graduate program at the University of Maryland. This transfer of credit is submitted to the Graduate Council for approval when the student applies for admission to candidacy for the degree. Acceptance of the transferred credits does not reduce the minimum residence requirement. The candidate is subject to final examination by this institution in all work offered for the degree.

Thesis. In addition to the twenty-four semester hours in graduate courses, a satisfactory thesis is required of all candidates for the degrees of Master of Arts and Master of Science. (Exceptions may be made in the cases of candidates for the degree of Master of Arts in American Civilization. See page 15.) The thesis must demonstrate the student's ability to do independent work and it must be acceptable in literary style and composition. With the approval of the student's major professor and the Dean of the Graduate School, the thesis in certain cases may be prepared *in absentia* under direction and supervision of a member of the faculty of this institution.

The original copy of the thesis must be deposited in the office of the Graduate School not later than the date specified in the calendar in the front of this catalog. The date published is the deadline for the acceptance of theses but they may be deposited earlier. The thesis should not be bound by the student, as the University later binds all theses uniformly. An abstract of the contents of the thesis, 200 to 500 words in length, must accompany it. A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before the typing of the manuscript is begun. Individual copies of this manual may be obtained by the student from the Student's Supply Store at nominal cost.

Final Examination. The final oral examination is conducted by a committee appointed by the Dean of the Graduate School. The student's adviser acts as the chairman of the committee. The other members of the committee are persons under whom the student has taken most of his major and minor courses. The chairman and the candidate are notified of the personnel of the examining committee at least one week prior to the period set for oral examinations unless an emergency arises. The chairman of the committee selects the exact time and place for the examination and notifies the other members of the committee and the candidate. The examination should normally be conducted at the end

of the semester, but upon recommendation of the student's adviser, an examining committee may be appointed by the Dean of the Graduate School at any time when all other requirements for the degree have been completed. A report of the committee is sent to the Dean as soon as possible after the examination. A special form for this purpose is supplied to the chairman of the committee and the approved must be unanimous. Such report is the basis upon which recommendation is made to the faculty that the candidate be granted the degree sought. The period for the oral examination is usually about one hour, but the time should be long enough to insure an adequate examination.

The examining committee also approves the thesis, and it is the candidate's obligation to see that each member of the committee has ample opportunity to examine a copy of the thesis prior to the date of the examination.

A student will not be admitted to final examination until all other requirements for the degree have been met. In addition to the oral examination a comprehensive written examination may be required at the option of the major department.

REQUIREMENTS FOR THE DEGREES IN AMERICAN CIVILIZATION

Studies in the American Civilization program are intended to prepare the candidate for teaching and research in American culture. The program is particularly designed for the teacher or student whose intellectual interest is not limited to a single academic department. For instance, the historian who likes literature, the literary critic who wishes to study the social background of literature, the political scientist who wishes to know more about the history of this country, and the sociologist who wants to study the roots of sociology in America, all may find the American Civilization program the proper one for them. The four cooperating departments of English, History, Government and Politics, and Sociology offer the basic work in the program, and the student will stress the work of one of those departments when he determines his course of graduate studies. All students, however, will be expected to understand the development of American institutions and to show some proficiency in the literary, social, economic, and political history of the United States.

The study of American Civilization brings in many different fields, so a student has an unusually wide opportunity to plan a program suited to his individual needs. To help him do this, a committee representing the departments whose American fields he intends to study is set up shortly after he registers. The chairman of the committee is from the department of the student's greatest interest and acts as his adviser. The committee also prepares and reads the student's comprehensive examination and reads the thesis if one is submitted.

The candidate for a degree must pass a final written examination testing his understanding of American Civilization in terms of his individual program of studies.

Master of Arts. With the approval of his advisers and committee, a candidate for the Master of Arts degree with a major in American Civilization may elect in lieu of the thesis six additional hours of course work, to include at least two substantial seminar papers. The total number of credit hours required for the degree would then be thirty semester hours.

Each candidate must present credits for at least fifteen semester hours of work in two of the four cooperating departments, and credits for at least fifteen semester hours in supporting courses (nine hours if a thesis is elected). Supporting courses will normally be in such fields as European or Latin-American history, English literature, comparative literature, philosophy, art, education, sociology, economics, and government and politics.

Each candidate must demonstrate in a written examination that he possesses a reading knowledge of one foreign language.

All other requirements are the same as for the degrees of Master of Arts and Master of Science in other fields.

Doctor of Philosophy. The American Civilization program cuts across several fields; therefore, a faculty committee representing the departments in which the student plans to study will be appointed shortly after the student registers. The chairman of the committee is from the department of the student's major interest and acts as his adviser. The committee is responsible for helping the student to integrate his program. Working through the student's adviser, the committee aids in planning the student's over-all program, prepares and grades any comprehensive examinations, and reads the dissertation.

The general requirements for the degree of Doctor of Philosophy in American Civilization are the same as those for the doctoral degree in other fields.

REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION

Thirty semester hours of course work are required, which may include courses in departments other than Education not to exceed one-half of the total thirty hours, such courses to be selected in conformity with the student's special needs as agreed upon by the student and his adviser. Of the thirty hours, not less than one-half must be on the 200 level.

At least four of the thirty semester hours must be in seminar work or other 200 courses in connection with which two seminar papers will be prepared in specially prescribed form, approved in writing by the instructor in charge of the course work and the student's adviser, and filed in the College of Education. One of these papers shall deal with a topic in the student's major field of concentration. The other paper may be written in a 200 course outside of the field of education.

The requirements in regard to advancement to candidacy, transfer of credits, and final oral examination are the same as for the degrees of Master of Arts and Master of Science.

REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

The Master of Business Administration program is designed primarily to train students for positions of responsibility in business and government. The aim is to develop technical competence plus a thorough knowledge and appreciation of the art of management. The study of administrative policies and practices encourages interest and realistic thinking in management problems and responsibilities.

The program leading to the degree of Master of Business Administration includes advanced study of business organization and administration in the fields of accounting and statistics, finance, general business, industrial management, insurance and real estate, marketing, personnel relations, public utilities and transportation.

Admission. Admission to the Master of Business Administration program is limited to those students whose undergraduate records from accredited institutions demonstrate special abilities and promise of further development. Undergraduate records, participation in student activities, and business experience are carefully evaluated. Personal interviews are desirable.

Those students whose major undergraduate work has been in arts, agriculture, science, education, or engineering subjects are required to complete certain basic core course requirements in business and economics before undertaking specialized graduate work for the degree of Master of Business Administration. The core course requirements are listed below. Responsible experience of exceptional value and importance may be substituted for specific courses.

Principles of Economics.....	6 hours	Marketing Principles	3 hours
Principles of Accounting.....	6 hours	Marketing Management	3 hours
Business Law	6 hours	Money and Banking.....	3 hours
Labor Economics	3 hours	Financial Management	3 hours
Personnel Management	3 hours	Statistics	3 hours

Curriculum Requirements. Requirements for the Master of Business Administration degree include the completion of at least thirty hours of graduate credit in a program approved by the faculty adviser. The thirty-hour program includes 24 credit hours of course work and 6 credit hours for the thesis. At least 12 hours and not more than 16 hours of course work will be taken in the student's major field of concentration. Courses outside the major field should be related to the student's interest, and it is strongly urged that at least two credit courses in economic theory or analysis be included.

Twelve hours of the required twenty-four credit hours must be made up of courses numbered in the catalog as 200 courses, which are courses limited to graduate students.

Thesis. A thesis representing research in the major field of concentration and submitted in partial satisfaction of the requirements for the Master of

Business Administration must be approved by the student's adviser and presented in its final form to the Dean of the Graduate School not later than the date specified in the calendar in the front of this catalog. The date published is the deadline for the acceptance of theses but they may be deposited earlier. Final approval of the thesis is given by the examination committee appointed by the Dean of the Graduate School. Detailed directions for the formal preparation of the thesis may be obtained from the Student's Supply Store.

Admission to Candidacy for the Master of Business Administration Degree. At the beginning of the semester in which the student plans to obtain the Master of Business Administration degree, he must make formal application to the Graduate Council for admission to candidacy for the degree. Such application must be endorsed by the student's faculty adviser, and by the head of the department in which he is studying.

The final requirement of the Master's program is the final examination, either written or oral as requested by the faculty adviser and the head of the department. The examination will cover three phases of the graduate work—the major field of specialization, the minor fields and defense of the thesis.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

The Doctor of Education degree is offered for students who hold or expect to hold teaching or administrative positions in education and who desire to develop exceptional competence in special areas. The ability to explore and solve practical educational problems is emphasized. The requirements are the same as for the degree of Doctor of Philosophy except as specified below.

Foreign Languages. The requirement of foreign languages may be waived for candidates for this degree when the program of study and research does not involve the use of foreign languages but such action must be approved by the Graduate Council. The requirements are determined by the Department of Education.

Major and Minor Subjects. The candidate must select one major area and one minor area in which he expects to develop exceptional competence. The minor may be a single area or may consist of a group of related areas selected to broaden the candidate's understanding of education. In addition to the major and minor, other areas if desired may be included in the program also. The amount of course work required in the major, minor, and related areas will vary according to the needs of each individual candidate.

Project. Instead of completing a thesis as required for a candidate for the degree of Doctor of Philosophy, a candidate for this degree must demonstrate exceptional competence to work through field problems by completing a project in the major area. A Committee on Doctoral Research is appointed for each candidate. The committee is composed of three members, at least two of whom are from the faculty of the College of Education. The committee passes upon the student's plans for research. The specialist in the student's major area serves as sponsor and provides detailed guidance for the project.

The regulations governing submission and form of copies of the project are the same as for the Doctor of Philosophy thesis.

Comprehensive Examination. A comprehensive examination must be passed before the candidate may take the final oral examination. The comprehensive examination may be oral or written, or both; it will cover the general field of major and minor study.

Final Oral Examination: The final examination covers the project and its relationship to the general field in which it lies and the candidate's attainments in related areas.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Advancement to Candidacy. Candidates for the Doctor's degree must be admitted to candidacy at least one academic year before the final examination. Applications for admission to candidacy for the Doctor's degree are made in duplicate by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. Blanks may be obtained at the office of the Graduate School.

The applicant must have demonstrated to the head of the Foreign Language Department that he possesses a reading knowledge of French and German. With the approval of the major department and the Graduate Council, in special cases another Foreign language may be substituted for either French or German. Preliminary examinations or such other substantial tests as the departments may elect are also required for admission to candidacy.

Residence. The equivalent of three years of full-time graduate study and research is the minimum required. Of the three years the equivalent of at least one year must be spent in residence at the University. On a part-time basis the time needed will be correspondingly increased. All work at other institutions offered in partial fulfillment of the requirements for the Doctor of Philosophy degree is submitted to the Graduate Council for approval, upon recommendation of the department concerned, when the student applies for admission to candidacy for the degree.

The Doctor's degree is not given merely as a certificate of residence and work, but is granted only upon sufficient evidence of high attainments in scholarship, and ability to carry on independent research in the special field in which the major work is done.

Major and Minor Subjects. The candidate must select a major and one or two closely related minor subjects. At least twenty-four semester hours, exclusive of research, are required in minor work. The remainder of the required residence is devoted to intensive study and research in the major field. The amount of required course work in the major subject will vary with the department and the individual candidate. The candidate must register for a minimum of twelve semester hours of research.

Thesis. The ability to do independent research must be shown by a dissertation on some topic connected with the major subject. An original type-written copy and two clear, plain carbon copies of the thesis, together with an abstract of the contents, 250 to 500 words in length, must be deposited in the office of the Dean not later than the date specified in the calendar in the front of this catalog. The date published is the deadline for the acceptance of theses but they may be deposited earlier. It is the responsibility of the student also to provide copies of the thesis for the use of the members of the examining committee prior to the date of the final examination.

The original copy should not be bound by the student, as the University later binds uniformly all theses for the general University library. The carbon copies are bound by the student in cardboard covers which may be obtained at the Students' Supply Store. The abstracts are published biennially by the University in a special bulletin.

A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before typing of the thesis is begun. Students may obtain copies of this manual at the Students' Supply Store.

Final Examination. The final oral examination is held before a committee appointed by the Dean. One member of this committee is a representative of the graduate faculty who is not directly concerned with the student's graduate work. One or more members of the committee may be persons from other institutions who are distinguished scholars in the student's major field.

The duration of the examination is approximately three hours, and covers the research work of the candidate as embodied in his thesis, and his attainments in the fields of his major and minor subjects. The other detailed procedures are the same as those stated for the Master's examination.

RULES GOVERNING LANGUAGE EXAMINATIONS FOR CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

1. A candidate for the Doctor's degree must show in a written examination that he possesses a reading knowledge of French and German. With the approval of the major department and the Graduate Council, in special cases another foreign language may be substituted for either French or German. The passages to be translated will be taken from books and articles in his specialized field. Some 300 pages of text from which the applicant wishes to have his examination chosen should be submitted to the head of the Department of Foreign Languages at least two weeks before the examination. The examination aims to test ability to use the foreign language for research purposes. It is presumed that the candidate will know sufficient grammar to distinguish inflectional forms and that he will be able to translate readily in two hours about 500 words of text, with the aid of a dictionary.

2. After the book has been approved it must be deposited in the office of the Department of Foreign Languages at least three days in advance of the test.

3. Examinations are held at the office of the Department of Foreign Languages, on the first Tuesday of October, February and June, at 2 P. M.

GRADUATE FEES

The fees paid by graduate students are as follows:

Matriculation fee of \$10.00. This is paid once only, upon first registration in the Graduate School.

Diploma fee for Master's degree, \$10.00.

Graduation fee for Doctor's degree including a hood, \$35.00.

College Park:

A fixed charge, each semester, of \$10.00 per semester credit hour for students carrying ten hours or less; for students carrying more than ten hours, \$100.00 for the semester.

Laboratory fees, where charged, range from \$1.00 to \$20.00 per course per semester.

There is a \$2.00 fine for violation of the University parking regulations. All graduate students are expected to abide by these regulations, regardless of full-time or part-time attendance.

Baltimore:

The fees for graduate work at the professional schools in Baltimore are determined by the individual school concerned. Students should consult the catalog of the respective school in which they intend to pursue their work.

Living Expenses and Self-Help:

The University in no way assumes responsibility for the housing or medical care of graduate students.

Board and lodging are available in many private homes in College Park and vicinity. The cost of board and room varies from about \$60.00 to \$75.00 a month, depending upon the desires of the individual. A list of accommodations is maintained by the housing bureau in the office of the Dean of Men.

Application for student employment, aside from fellowships and assistantships, may be made through the offices of the Dean of Men and the Dean of Women, or to department heads.

FELLOWSHIPS AND ASSISTANTSHIPS

Fellowships. A number of fellowships have been established by the University. The stipend for the University fellows is \$675 for nine months and the remission of all graduate fees except the diploma fee. Several industrial and special fellowships, with varying stipends, are also available in certain departments.

University Fellows are permitted to carry a full graduate program, and they may satisfy the residence requirement for higher degrees in the normal time.

Applications for fellowships are made on blanks which may be obtained from the office of the Graduate School. The application, with the necessary credentials, is sent by the applicant directly to the Dean of the Graduate School. Applications which are approved by the Dean are forwarded to the departments, where final selection of the fellows is made. The awards of University fellowships are on a competitive basis.

Graduate Assistantships. A number of teaching and research assistantships are available in several departments. The compensation is \$120.00 per month unless otherwise specified and varies with the nature and amount of service required and with the terms of appointment. The amount of credit allowed toward a degree is normally ten credit hours. The research assistants, especially those in the Experiment Station, usually participate in research that meets the requirements for a Master's or a Doctor's degree.

Applications for graduate assistantships are made directly to the departments concerned and appointments are made through the regular channels for staff appointments. Further information regarding these assistantships may be obtained from the department or college concerned.

COMMENCEMENT

Attendance is required at the June commencement if the degree is conferred at that time.

Application for diploma must be filed in the office of the Registrar eight weeks before the date at which the candidate expects to obtain a degree except during the summer season.

Academic costume is required of all candidates at the June commencement. Those who so desire may purchase or rent caps and gowns at the Students' Supply Store. Order must be filed eight weeks before the date of convocation but may be cancelled later if the student finds himself unable to complete his work for the degree.

DESCRIPTION OF COURSES

For the convenience of students in making out schedules of studies, the subjects in the following Description of Courses are arranged alphabetically:

Aeronautical Engineering	25
Agricultural Economics	27
Agricultural Education and Rural Life	29
Agronomy	30
Anatomy	111, 113
Animal Husbandry	33
Bacteriology	33, 115
Biochemistry	112
Botany	35, 120
Business Administration	38

Chemical Engineering	42
Chemistry	45
Civil Engineering	49
Comparative Literature	51
Dairy	51
Dentistry	111
Economics	53
Education	54
Electrical Engineering	64
English Language and Literature	66
Entomology	69
Foreign Languages and Literature	70
Geography	74
Government and Politics	77
Histology and Embryology	112
History	80
Home Economics	82
Horticulture	87
Legal Medicine	
Mathematics	88
Mechanical Engineering	91
Medicine	113
Oral Pathology	
Oral Surgery	113
Pharmaceutical Chemistry	121
Pharmacognosy	120
Pharmacology	117, 122
Pharmacy	119
Philosophy	93
Physical Education, Health, Recreation	95
Physics	97, 123
Physiology	113, 118
Poultry Husbandry	101
Practical Art	83
Psychology	101
Sociology	105
Speech	107
Veterinary Science	109
Zoology	109

METHOD OF NUMBERING COURSES AND COUNTING CREDIT HOURS

Courses for Advanced Undergraduates and Graduates are numbered 100 to 199; courses for Graduates only are numbered 200 and upward.

A course with a single number extends through one semester.

A course with a double number extends through two semesters.

The number of semester hour credits is shown by the arabic numerals in parentheses after the title of the course. Examples:

Course 101. Title (3). First semester.

If a laboratory course:

Course 101. Title (3). One lecture and two laboratory periods a week, first semester.

(This is a semester course: offered once a year.)

Course 101. Title (3). First and second semesters.

(This is a semester course, repeated each semester, and except for research, seminar, and certain problem courses, must be taken only one semester.)

Course 103, 104. Title (3, 3). Three hours a week, first and second semesters.

If a laboratory course:

Course 103, 104. Title (3, 3). One lecture and two laboratory periods a week, first and second semesters.

(This is a course extending through two semesters and carrying three semester credits each semester.)

Course 103, 104. Title (3, 3). Three hours a week, second and first semesters.

(This is a course extending through two semesters, but it begins with the the second semester.)

Course 105, f, s. Title (3, 3). Three hours a week, first and second semesters.

(This is alternate way of listing a two-semester course.)

AERONAUTICAL ENGINEERING

Professor Sherwood; Associate Professor Corning, Shen; Assistant Professor Guess.

The Department of Aeronautical Engineering offers courses and opportunities for research leading to the degree of Master of Science in Aeronautical Engineering.

The candidates may elect off-campus subjects given under the Graduate School of the University of Maryland, but must receive a minimum of 6 semester hours of instruction at College Park and pass with a grade of B or

higher. An acceptable thesis written under the guidance of the faculty is required.

Facilities for graduate research include a complete subsonic laboratory consisting of a 7.75 x 11 ft. wind tunnel and related shops, offices and photographic equipment. For high speed research, a 6" x 6" supersonic wind tunnel is available with Schlieren optical system, instantaneous strain-gauge type pressure pick-ups, remote angle of attack control and other accessories. A 100 h. p. rotary vacuum pump provides adequate pumping capacity for 10 second runs at 2 minute intervals.

The general aerodynamics laboratory is equipped with the following major items: a two foot subsonic wind tunnel, a ballistics range for measuring supersonic drag of projectile-shaped bodies, a water table for simulating compressible flow by hydraulic analogy, a large electrolytic tank for the solution of potential flow problems, manometer boards, and high speed flash photographic equipment.

The structures laboratory has a 400,000 pound capacity universal testing machine, hydraulic tension-compression jacks and pumps, and lead shot bags for applying structural loading. Traction dynamometers and SR-4 tension-compression load cells are available to measure loads. The laboratory has SR-4 strain indication equipment, extensometers, compressometers, Huggenberger extensometers, and a recording oscillograph for measuring strain. Dial gages and a transit are available for measuring deflections.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Aero. E. 101. Aerodynamics I (3). Three lectures a week, second semester. Sherwood.
- Aero. E. 102. Aerodynamics II (2). Two lectures a week, first semester. Continuation of Aero E. 101. Sherwood.
- Aero. E. 103. Airplane Detail Drafting (1). One laboratory period a week, first semester. Prerequisite, Dr. 3. Corning.
- Aero. E. 105, 106. Airplane Fabrication Shop (1, 1). One laboratory period a week for 105; and one lecture a week for 106. Prerequisite, Shop 2. Eckard, Hutton.
- Aero. E. 107, 108. Airplane Design (4, 4). Two lectures and two supervised calculation periods per week, first and second semesters. Prerequisites, Aero. E. 101, Aero. E. 104, and M. E. 52. Aero. E. 102 and Aero. E. 113 to be taken concurrently. Corning.

LIBRARIES

The libraries of the university are located on both the College Park and Baltimore campuses. They consist of the General Library, the Library Annex and the many college and departmental libraries which house special collections. Because of the location of the university the large libraries of Baltimore and Washington are a valuable asset to graduate work. Arrangements can be made

for personal work in the Enoch Pratt Library of Baltimore, the Library of Congress, the United States Department of Agriculture Library and the many fine collections of other government agencies in Washington.

MISCELLANEOUS INFORMATION

For information in reference to the University grounds, buildings, equipment, transcripts of records, off-campus housing, meals, athletics and recreation, religious denominational clubs, fraternities, sororities, societies and special clubs, student publications, University supply store, write to the Director of Publications for the General Information Issue of the Catalog.

Aero. E. 109, 110. Aircraft Power Plants (3, 3). Three lectures and one laboratory period a week, first and second semesters. Prerequisites, M. E. 52, M. E. 100.

Aero. E. 111, 112. Aeronautical Laboratory (2, 2). One lecture and one laboratory period a week, first and second semesters. Prerequisite, Aero. E. 101. To be taken concurrently with Aero. E. 102 and Aero. E. 113. Staff.

Aero. E. 113, 114. Mechanics of Aircraft Structures (3, 4). First and second semesters. Prerequisite, M. E. 52 and Math. 64. Guess.

Aero. E. 115. Aerodynamics III (3). Second semester. Elementary theory of the flow of a compressible gas at subsonic and supersonic speeds. Prerequisite, Aero. E. 102. Sherwood.

FOR GRADUATES

Aero. E. 200, 201. Advanced Aerodynamics (3, 3). Three lectures a week, first and second semesters. Prerequisites, Aero. E. 101, 102, 115, Math. 64.

Aero. E. 202, 203. Advanced Aircraft Structures (3, 3). First and second semesters. Prerequisites, Aero. E. 113, 114.

Aero. E. 204. Aircraft Dynamics (3). First semester. Prerequisites, Math. 64 and Aero. E. 114. Shen.

Aero. E. 205. Aircraft Dynamics (3). Second semester. Prerequisites, Math. 64, Aero. E. 114 and Aero. E. 101. Shen.

Aero. E. 206, 207. Advanced Aircraft Power Plants (3, 3). Two lectures and one laboratory period a week, first and second semesters. Prerequisites, M. E. 100; Aero. E. 109, 110.

Aero. E. 208. Advanced Aircraft Design (3). Three lectures a week, first semester. Prerequisites, Aero. E. 107, 108; Math. 64. Corning.

Aero. E. 209. Stability and Control (3). Three lectures a week, second semester. Prerequisites, Aero. E. 101, 102, 115. Corning.

Aero. E. 210. Aerodynamic Theory (3). First semester. Prerequisites, Aero. E. 101, 102, Math. 64. Shen.

Aero. E. 211. The Design and Use of Wind Tunnels (Supersonic) (3). First and second semesters. Kurzweg.

Aero. E. 212, 213. Bodies at Supersonic Speeds (3, 3). First and second semesters. Prerequisites, degree in Aero. E. or M. E. or equivalent, and consent of instructor. Kurzweg.

Aero. E. 214. Seminar. (Credit in accordance with work outlined by Aero. Engr. staff.) First and second semesters. Prerequisite, graduate standing.

Aero. E. 215. Research. (Credit in accordance with work outlined by Aero. Engr. staff.) First and second semesters. Prerequisite, graduate standing.

Aero. E. 216. Selected Aeroballistics Problems (3). First semester. Prerequisite, degree in Aero. E. or M. E. or equivalent and consent of instructor. Kurzweg.

Aero. E. 217. Aerodynamics of Viscous Fluids (3). Second semester. Prerequisite, Aero. E. 101, 115, Math. 64. Shen.

Aero. E. 218. Selected Topics in Aerodynamic Theory (3). First or second semesters. Topics of current interest and recent advances in the field of aerodynamics. Prerequisites, Aero. E. 210, 115. Shen.

AGRICULTURAL ECONOMICS AND MARKETING

Professors Nystrom, DeVault, (emeritus) Beal, Walker; Associate Professors Hamilton, Poffenberger, Shull; Assistant Professors Bohanan, Smith; Instructor Burns.

The Department offers a course of study leading to the degrees of Master of Science and Doctor of Philosophy. Although the major field is Agricultural Economics, thesis topics may be selected and courses concentrated in Farm Management, Farm Taxation, Farm Finance, Marketing and Land Economics.

Departmental requirements, supplementary to the Graduate School, have been formulated for the guidance of candidates for graduate degrees. Copies of these requirements may be obtained from the Department of Agricultural Economics and Marketing.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

A. E. 100. Farm Economics (3). First semester. Prerequisites, Econ. 31, 32, or Econ. 37. Shull.

A. E. 101. Marketing of Farm Products (3). Second semester. Prerequisites, Econ. 31, 32, or Econ. 37. Shull.

A. E. 103. Cooperation in Agriculture (3). First semester. Poffenberger.

A. E. 104. Farm Finance (3). Second semester. Poffenberger.

- A. E. 105. Food Products Inspection (2). One lecture and one laboratory period a week, second semester. Staff.
- A. E. 106. Prices of Farm Products (3). Second semester. Poffenberger.
- A. E. 107. Analysis of the Farm Business (3). First semester. Hamilton.
- A. E. 108. Farm Management (3). Second semester. Hamilton.
- A. E. 109. Research Problems (1-2). First and second semesters. Staff.
- A. E. 110. Seminar (1, 1). First and second semesters. Hamilton.
- A. E. 111. Land Economics (3). First semester. Bohanan.
- A. E. 114. Foreign Trade in Farm Products (3). Second semester. Shull.
- A. E. 115. Marketing of Dairy Products (3). First semester. Beal.
- A. E. 116. Marketing of Fruits and Vegetables (3). Second semester. Burns.
- A. E. 117. Economics of Marketing Eggs and Poultry (3). Second semester. Smith.

Technology of Market Eggs and Poultry. See Poultry Husbandry, P. H. 104.
Poultry Industrial and Economic Problems. See Poultry Husbandry, P. H. 107.

Market Milk. See Dairy, Dairy 109.

Livestock Markets and Marketing. See Animal Husbandry, A. H. 150.

Meat and Meat Products. See Animal Husbandry, A. H. 160.

Economics of Cooperatives. See Economics, Econ. 151.

Advertising Programs and Campaigns. See Business Administration, B. A. 151.

Retail Store Management. See Business Administration, B. A. 154.

FOR GRADUATES

- A. E. 200, 201. Special Problems in Farm Economics (2, 2). First and second semesters. Staff.
- A. E. 202. Seminar (1, 1). First and second semesters. Staff.
- A. E. 203. Research. Credit according to work accomplished. Staff.
- A. E. 205. Special Problems in Dairy Marketing (2). Second semester. Pre-requisite, A. E. 115 or equivalent. Beal.
- A. E. 208. Agricultural Policy (3). Second semester. Beal.
- A. E. 210. Agricultural Taxation (2). First semester. Walker.

- A. E. 211. **Functional Aspects of Farm Taxation (3).** Second semester. Two lectures and one laboratory period a week. Walker.
- A. E. 215. **Advanced Agricultural Cooperation (3).** First semester. Poffenberger.
- A. E. 216. **Advanced Farm Management (3).** Second semester. (—).
- A. E. 218. **Agricultural Economics Research Techniques (2).** Second semester. Bohanan.
- A. E. 219. **Advanced Land Economics (3).** First semester. Bohanan.

AGRICULTURAL EDUCATION AND RURAL LIFE

Professors Ahalt, Cotterman; Associate Professor Murray.

This department offers work leading to the degree of Master of Science. Students may work full-time towards a degree or they may complete the requirements on a part-time basis, taking the special three-week courses offered for agriculture teachers in summer, regular six-week summer school courses, and courses offered in the evenings and on Saturday during the school year.

Some students profitably elect special problems courses, mostly in agriculture, in which they work on problems in their local school and community. All students are required to enroll in a minimum of four of the three-week summer sessions for agriculture teachers or the equivalent in course work on the campus at College Park.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- R. Ed. 107. **Observation and Analysis of Teaching in Agriculture (3).** Second semester. Two lectures and one laboratory period a week. Murray.
- R. Ed. 109. **Teaching Secondary Vocational Agriculture (3).** First semester. Ahalt, Murray.
- R. Ed. 111. **Teaching Young and Adult Farmer Groups (1).** First semester. Murray.
- R. Ed. 112. **Departmental Management (1).** Second semester. One laboratory period a week. Prerequisites, R. Ed. 107, 109. Ahalt, Murray.
- R. Ed. 114. **Rural Life and Education (3).** Second semester. Ahalt.
- R. Ed. 150. **Extension Education (2).** Second semester. (—).
- R. Ed. 160. **Agricultural Information Methods (2).** First semester. (—).

FOR GRADUATES

- R. Ed. 201, 202. **Rural Life and Education (3, 3).** First and second semesters, alternate years. Prerequisite, R. Ed. 114, or equivalent. Ahalt.
- R. Ed. 207, 208. **Problems in Vocational Agriculture (2, 2).** First and second semesters, alternate years. Ahalt, Murray.

- R. Ed. S207 A-B. Problems in Teaching Vocational Agriculture (1-1). Summer session only.
- R. Ed. S208 A-B. Problems in Teaching Farm Mechanics (1, 1). Summer session only.
- R. Ed. S209 A-B. Adult Education in Agriculture (1-1). Summer session only.
- R. Ed. S210 A-B. Land Grant College Education (1-1). Summer session only.
- R. Ed. S211 A-B. Agricultural Extension Service Education (1-1). Summer session only.
- R. Ed. S212 A-B. Educational Functions of Rural Institutions (1-1). Summer session only.
- R. Ed. S213 A-B. Supervision and Administration of Vocational Agriculture (1-1). Summer session only.
- R. Ed. 215. Supervision of Student Teaching (1). Arranged. Summer session only.
- R. Ed. 220. Field Problems in Rural Education (1-3). Second semester. Summer session. Prerequisite, six semester hours of graduate study.
Ahalt, Murray.
- R. Ed. 240. Agricultural College Instruction (1). Second semester.
Cotterman, Ahalt.
- R. Ed. 250. Seminar in Rural Education (1-1). First and second semesters.
Staff.
- R. Ed. S250 A-B. Seminar in Rural Education (1-1). Summer session only.
- R. Ed. 251. Research. Credit according to work done.
Staff.

AGRONOMY—CROPS AND SOILS

Professor Kuhn; Associate Professors Axley, Bourbeau, Street;
Assistant Professors Liden, Ronning, Strickling.

The Department of Agronomy offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy. The student may pursue major work in the Crops Division or in the Soils Division of the Department. A thesis based on original research is required for each degree. Ample laboratory and greenhouse facilities for graduate work are available on the campus. The Plant Research Farm and the Tobacco Experimental Farm offer adequate nearby field research facilities. Many projects of the Department are conducted in cooperation with the Bureau of Plant Industry and Soils of the United States Department of Agriculture with headquarters located three miles from the campus.

A. Crops

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Agron. 103. Crop Breeding (2).** First semester. Prerequisite, Zool. 104.
Ronningен.
- Agron. 105. Tobacco Production (2).** Two lectures a week, first semester.
Prerequisite, Agron. 1. Street.
- Agron. 106. Tobacco Production (2).** Two lectures a week, second semester.
Prerequisite, Agron. 105. Street.
- Agron. 151. Cropping Systems (2).** Second semester. Kuhn.
- Agron. 152. Seed Production and Distribution (3).** Two lectures and one
laboratory (2 hr.) period a week, second semester. Prerequisite, Agron. 1.
Liden.

FOR GRADUATES

- Agron. 201. Crop Breeding (2-4).** Second semester. Prerequisite, consent of
instructor. Ronningен.
- Agron. 203. Crop Seminar (1, 1).** First and second semesters. Staff.
- Agron. 204. Technic in Field Crop Research (2).** First semester. Kuhn.
- Agron. 205. Advanced Tobacco Production (2).** Two lectures a week, second
semester. Prerequisite, consent of instructor. (Not offered 1953-54.)
Street.
- Agron. 206, 207. Recent Advances in Crop Production (2, 2).** Two lectures a
week, first semester. Prerequisite, consent of instructor. Agron. 207 not
offered 1953-54. Kuhn, Street, Ronningен.
- Agron. 208. Research Methods (2-4).** Second semester. Prerequisite, consent
of staff. Staff.
- Agron. 209. Research in Crops (1-8).** First and second semesters. Staff.
- Agron. S210. Cropping Systems (1).** Summer only. Kuhn.

B. Soils

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Agron. S110. Soil Management (1).** Summer only. Strickling.
- Agron. 111. Soil Fertility Principles (3).** Three lectures a week, first semester.
Prerequisite, Agron. 10. Strickling.
- Agron. 112. Commercial Fertilizers (3).** Three lectures a week, second
semester. Prerequisite, Agron. 10. Axley.

Agron. 113. Soil Conservation (3). Two lectures and one three-hour laboratory a week, first semester. Prerequisite, Agron. 10 or permission of the instructor. Bentz.

Agron. 114. Soil Classification (3). Two lectures and one three-hour laboratory period a week, first semester. Prerequisite, Agron. 10. Bourbeau.

Agron. 115. Soil Geography (3). Two lectures and one three-hour laboratory period a week, second semester. Prerequisite, Agron. 114, or Geo. 30, 40, and 41, or permission of instructor. Bourbeau.

Agron. 116. Soil Investigation Methods (3). One hour lecture, one two-hour laboratory, and one three-hour laboratory a week, first semester. Prerequisite, Agron. 10 or permission of instructor. Axley.

Agron. 117. Soil Physics (3). Two lectures and one three-hour laboratory a week, second semester. Prerequisite, Agron. 10 and a course in Physics, or permission of instructor. Strickling.

Agron. 118. Special Problem in Soils (1). First and second semesters. Prerequisite, Agron. 10 and permission of instructor. Staff.

FOR GRADUATES

Agron. 250. Soil Minerology (3). Three one-hour lectures a week, second semester. Prerequisite, Agron. 10 and permission of instructor.

Bourbeau.

Agron. 251. Advanced Methods of Soil Investigation (3). Three one-hour lectures a week, first semester. Prerequisite, Agron. 10 and permission of instructor.

Axley.

Agron. 252. Advanced Soil Physics (3). Two lectures and one three-hour laboratory a week, second semester. Prerequisite, Agron. 10 and permission of instructor.

Strickling.

Agron. 253, 254. Soil Research Technique (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisite, Agron. 10 and permission of instructor.

Axley.

Agron. 255. Soil Seminar (1, 1). First and second semesters. Prerequisite, Agron. 10 and permission of instructor.

Staff.

Agron. 256. Soil Research (1-12). First and second semesters.

Staff.

AMERICAN CIVILIZATION

Professor Bode and cooperating specialists.

The American Civilization program offers work leading to both the degrees of Master of Arts and Doctor of Philosophy. The departments of English, History, Government and Politics, and Sociology join to offer integrated plans

of study. In his class work the student will emphasize the offerings of any one of these departments. For lists of courses from which his particular program is to be developed, he is to see principally the listings of the four departments just mentioned. His adviser will be the chairman of the department whose work the student plans to emphasize, or if not the chairman then someone appointed by him.

Amer. Civ. 137, 138. Conference Course in American Civilization (3, 3). First and second semesters. Four American classics, drawn from the fields of the cooperating departments, are studied in detail each semester. Specialists from the appropriate departments lecture on these books. The classics for this year are: Franklin's **Autobiography**, De Tocqueville's **Democracy in America**, Bryce's **American Commonwealth**, and Thoreau's **Walden**, for the first semester; and for the second semester, Twain's **The Adventures of Huckleberry Finn**, Howell's **Rise of Silas Lapham**, the Lynds' **Middletown**, and Myrdal's **An American Dilemma**.

The Conference Course, or either semester of it, may be chosen by a student outside the program as an elective. It also counts as major credit for the four cooperating departments. The course meets like a seminar, once a week.

ANIMAL HUSBANDRY

Professors Foster, Green; Associate Professor Kerr; Assistant Professor Buric; Instructor Leffel.

The Department of Animal Husbandry offers work leading to the degree of Master of Science. Although the major field is Animal Husbandry, course work and thesis problems are offered in the fields of animal breeding, livestock management, meats, and nutrition.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- A. H. 111. Animal Nutrition (3).** Three one-hour lectures a week, first semester. Prerequisite, Chem. 31, 32, 33, 34; A. H. 110 or permission of instructor. Graduate credit allowed with permission of instructor. Shaw.
- A. H. 120. Principles of Breeding (3).** Three one-hour lectures a week, second semester. Prerequisite, Zool. 104. Graduate credit (1-3 hours) allowed with permission of instructor. Green.
- A. H. 150. Livestock Markets and Marketing (2).** Two one-hour lectures a week, first semester. Prerequisite, A. H. 1. Graduate credit allowed with permission of instructor. Kerr.

FOR GRADUATES

- A. H. 200, 201. Special Problems in Animal Husbandry (1-2, 1-2).** First and second semesters. Work assigned in proportion to amount of credit. Prerequisite, approval of staff. Staff.

- A. H. 202, 203.** Seminar (1, 1). First and second semesters. Staff.
- A. H. 204.** Research (1-6). First and second semesters. Credit to be determined by amount and character of work done. Staff.
- A. H. 205.** Advanced Breeding (2). Two one-hour lectures a week, second semester. Prerequisites, Zool. 104; A. H. 120; one course in biological statistics. Green.
- A. H. 206.** Advanced Livestock Management (3). Two lectures and one laboratory period a week, first semester. Prerequisite, approval of staff. Staff.

BACTERIOLOGY

Professors Faber, Hansen, Pelezar; Visiting Professors Smadel, Warren; Associate Professor Laffer; Assistant Professor Doetsch; Lecturer Kent.

The Department of Bacteriology offers the degrees of Master of Science and Doctor of Philosophy.

Graduate students associated with institutions away from the College Park campus are required to take a minimum of 12 credit hours, exclusive of research, during one semester at College Park for the degree of Master of Science, and a minimum of 24 credit hours, exclusive of research, during two semesters at College Park for the degree of Doctor of Philosophy.

The research project, the experimental approach employed, and progress made must meet with the approval of the head of the department.

Further information concerning graduate work in Bacteriology may be obtained from the department.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bact. 101. Pathogenic Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 5. Faber.
- Bact. 103. Serology (4).** Two lectures and two laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, Bact. 101. Faber.
- Bact. 104 History of Bacteriology (1).** One lecture period a week, first semester. Prerequisite, a major or minor in bacteriology. Doetsch.
- Bact. 105. Clinical Methods (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 101. Faber.
- Bact. 108. Epidemiology and Public Health (3).** Three lecture periods a week, second semester. Prerequisite, Bact. 101. Faber.
- Bact. 121. Advanced Methods (2).** Two two-hour laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, consent of instructor. Hansen.

- Bact. 131. **Food and Sanitary Bacteriology (4).** Two lectures and two laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, Bact. 1. Laffer.
- Bact. 133. **Dairy Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, Bact. 1. Doetsch.
- Bact. 135. **Soil Bacteriology (4).** Two lecture and two laboratory periods a week, second semester. Laboratory fee, \$10.00. Prerequisite, Bact. 1. Hansen.
- Bact. 161. **Systematic Bacteriology (2).** Two lecture periods a week, first semester. Prerequisite, 16 credits in bacteriology. Hansen.
- Bact. 181. **Bacteriological Problems (3).** First and second semesters. Prerequisite, 16 credits in bacteriology. Laboratory fee, \$10.00. Registration only upon the consent of the instructor. Staff.

FOR GRADUATES

- Bact. 201. **Advanced Pathogenic Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, 30 credits in bacteriology and allied fields, including Bact. 103. Laffer.
- Bact. 204. **Bacterial Metabolism (2).** Two lecture periods a week, first semester. Prerequisite, 30 credits in bacteriology and allied fields, including Chem. 161 and 162. Pelczar.
- Bact. 206, 208. **Special Topics (1, 1).** One lecture period a week, first and second semesters. Prerequisite, 20 credits in bacteriology. Staff.
- Bact. 210. **Virology (1).** One lecture period a week, second semester. Prerequisite, Bact. 101 or equivalent. Warren.
- Bact. 211. **Virology Laboratory (2).** One lecture and one laboratory period a week, second semester. Laboratory fee, \$20.00. Prerequisite, Bact. 101 or equivalent. Registration only upon consent of instructor. Smadel.
- Bact. 214. **Advanced Bacterial Metabolism (1).** One lecture period a week, second semester. Prerequisite, Bact. 204 and consent of instructor. Pelczar.
- Bact. 231. **Advanced Food Bacteriology (4).** Two lecture and two laboratory periods a week, first semester. Laboratory fee, \$10.00. Prerequisite, 30 credits in bacteriology, including Bact. 131. Laffer.
- Bact. 280. **Seminar—Research Methods (1).** First and second semesters. Prerequisite, permission of instructor. Staff.
- Bact. 282. **Seminar—Bacteriological Literature (1).** Prerequisite, permission of instructor. Staff.
- Bact. 291. **Research.** First and second semesters. Laboratory fee, \$10.00. Staff.

BOTANY

Professors Bamford, Jeffers, Gauch, Cox, Weaver, Appleman (emeritus), Norton (emeritus); Associate Professor Brown; Assistant Professors D. T. Morgan, O. D. Morgan, Dugger, Rappleye, Keller; Research Associate Krauss.

The Department of Botany offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy. The student may pursue major work in any one of the three main divisions of the department, namely: Plant Physiology, Plant Pathology, or Plant Morphology, Cytology and Cytogenetics. Since a thesis based on original research is required for each degree, a qualified student may be allowed to pursue a problem of his own choosing, but it is more probable that the subject of his research will be that already in progress since the department is devoted to a study of basic agricultural problems as well as projects of a more fundamental nature.

An individual employed at a nearby institution may submit a thesis on his research work at the institution under the direction of, and approved by, a member of the faculty. Laboratory facilities are available for research in each division, and there are ample greenhouses and plot space available on the campus or adjacent University farm land.

In addition to the normal requirements of the Graduate School, one must possess a reading knowledge of either French or German, before the Master of Science degree is granted.

A. Plant Physiology

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Bot. 101. Plant Physiology (4). First semester. Two lectures and two laboratory periods a week. Prerequisites, Bot. 1, and general chemistry. Laboratory fee, \$5.00. Gauch, Dugger.

Bot. 102. Plant Ecology (3). Second semester. Two lectures and one laboratory period a week. Prerequisites, Bot. 11, or equivalent. Laboratory fee, \$5.00. Brown.

FOR GRADUATES

Bot. 201. Plant Biochemistry (4). First semester. Prerequisites, Bot. 101, and elementary organic chemistry, or equivalent. Laboratory fee, \$5.00. (Not offered 1953-54.) Gauch.

Bot. 202. Plant Biophysics (2). Second semester. Prerequisites, Bot. 101, and elementary physics, or equivalent. Dugger.

Bot. 203. Biophysical Methods (2). Second semester. To accompany Bot. 202. Same prerequisites. Laboratory fee, \$5.00. Dugger.

Bot. 204. Growth and Development (2). First semester. Prerequisite, 12 semester hours of plant science. Dugger.

- Bot. 205. Mineral Nutrition of Plants (2).** Second semester. Prerequisite, Bot. 101, or equivalent. (Not offered 1953-1954.) Gauch.
- Bot. 206. Research in Plant Physiology.** Credit according to work done. Gauch, Dugger.
- Bot. 207. Special Topics in Plant Physiology (2).** Second semester. Prerequisite, permission of instructor.
- Bot. 208. Seminar in Plant Physiology (1).** First and second semesters. Prerequisite, permission of instructor. Gauch, Dugger.

B. General Botany and Morphology

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bot. 111. Plant Anatomy (3).** First semester. One lecture and two laboratory periods a week. Prerequisite, Bot. 110, or equivalent. Laboratory fee, \$5.00. Rappleye.
- Bot. 113. Plant Geography (2).** First semester. Prerequisite, Bot. 1, or equivalent. Brown.
- Bot. 114. Advanced Plant Taxonomy (2).** First semester. Two laboratory periods a week. Prerequisite, Bot. 11, or permission of instructor. Laboratory fee, \$5.00. Brown.
- Bot. 115. Structure of Economic Plants (3).** Second semester. One lecture and two laboratory periods a week. Prerequisite, Bot. 111. Laboratory fee, \$5.00. Rappleye.
- Bot. 116. History and Philosophy of Botany (1).** First semester. Prerequisite, 15 semester hours of botany. Bamford.
- Bot. 117. Plant Breeding (2).** Second semester. Prerequisite, Zool. 104, or equivalent. D. T. Morgan.
- Bot. 133. Bryophytes and Pteridophytes (3).** Second semester. One lecture and two laboratory periods a week. Prerequisites, Bot. 1, Bot. 2, or equivalent. Laboratory fee, \$5.00. (Not offered 1953-1954.)
- Bot. 135. Aquatic Plants (3).** First semester. One lecture and two laboratory periods a week. Prerequisites, Bot. 1, Bot. 11 or equivalent. Laboratory fee \$5.00. (Not offered 1953-1954.)
- Bot. 136. Plants and Mankind (2).** First semester. Prerequisite, Bot. 1 or equivalent. (Not offered 1953-1954.) Rappleye.
- Bot. 151S. Teaching Methods in Botany (2).** Summer. Prerequisite, Bot. 1, or equivalent. Laboratory fee, \$5.00. Owens.

FOR GRADUATES

- Bot. 211. Cytology (4).** Second semester. Two lectures and two laboratory periods a week. Prerequisites, Bot. 110, Zool. 104. Laboratory fee, \$5.00
Bamford, D. T. Morgan.
- Bot. 212. Plant Morphology (3).** First semester. One lecture and two laboratory periods a week. Prerequisites, Bot. 11, Bot. 111, or equivalent. Laboratory fee, \$5.00.
Rappleye.
- Bot. 213. Seminar in Plant Cytology and Morphology (1).** First and second semesters. Prerequisite, permission of instructor. D. T. Morgan, Rappleye
- Bot. 214. Research in Plant Cytology and Morphology.** Credit according to work done. Bamford, D. T. Morgan.
- Bot. 215. Plant Cytogenetics (3).** First semester. Prerequisites, Zool. 104, Bot. 211. Laboratory fee, \$5.00. D. T. Morgan.
- Bot. 219. Special Topics in Plant Morphology and Cytology (2).** First semester. Prerequisite, permission of instructor.

C. Plant Pathology

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Bot. 122. Research Methods in Plant Pathology (2).** First or second semester. Two laboratory periods a week. Prerequisite, Bot. 20, or equivalent. Laboratory fee, \$5.00. Cox.
- Bot. 123. Diseases of Ornamental Plants (2).** Second semester. Prerequisite, Bot. 20, or equivalent. Keller.
- Bot. 124. Diseases of Tobacco and Agronomic Crops (2).** First semester. Prerequisite, Bot. 20, or equivalent. (Not offered 1953-1954.) O. D. Morgan.
- Bot. 125. Diseases of Fruit Crops (2).** First semester. Prerequisite, Bot. 20, or equivalent. Weaver.
- Bot. 126. Diseases of Vegetable Crops (2).** Second semester. Prerequisite, Bot. 20, or equivalent. (Not offered 1953-1954.) Cox.
- Bot. 128. Mycology (4).** Second semester. Two lectures and two laboratory periods a week. Prerequisite, Bot. 2, or equivalent. Laboratory fee, \$5.00. Jeffers.
- Bot. 152S. Field Plant Pathology (1).** Summer, first three weeks. Laboratory fee, \$5.00. Prerequisite, Bot. 20, or equivalent. (Not offered 1953.) Cox, Staff.

FOR GRADUATES

- Bot. 221. Virus Diseases (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, Bot. 20, 101. Laboratory fee, \$5.00. (Not offered 1953-1954.) Keller.

- Bot. 222. Plant Nematology (2).** Two lectures. Prerequisite, Bot. 20, or equivalent. (Not offered 1953-1954.)
- Bot. 225. Research in Plant Pathology.** Credit according to work done. Staff.
- Bot. 226. Plant Disease Control (3).** First semester. Prerequisite, Bot. 20, or equivalent. Cox.
- Bot. 228. Special Topics in Plant Pathology (2).** Second semester. Prerequisite, permission of instructor.
- Bot. 229. Seminar in Plant Pathology (1).** First and second semesters. Prerequisite, permission of instructor. Jeffers, Cox.

BUSINESS ADMINISTRATION

Professors Frederick, Calhoun, Clemens, Cook, Cover, Fisher, Mounce, Pyle, Reid, Sweeney, Sylvester, Watson, Wedeberg, Wright; Associate Professors Hale, Raines; Assistant Professors Ash, Cronin, Daiker, Nelson, Taff; Instructors Edelson, Lee, Richard.

The degree of Master of Business Administration is conferred on those students who satisfactorily complete the requirements which are set forth in the section of this catalog entitled, "Requirements for the Degree of Master of Business Administration."

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- B. A. 110, 111. Intermediate Accounting (3, 3).** First and second semesters. Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Daiker.
- B. A. 116. Public Budgeting (3).** Prerequisites, B. A. 21 and Econ. 32.
- B. A. 118. Governmental Accounting (3).** Prerequisite, B. A. 111.
- B. A. 121. Cost Accounting (4).** Second semester. Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Sweeney.
- B. A. 122. Auditing Theory and Practice (3).** First semester. Prerequisite, B. A. 111. Wright.
- B. A. 123 Income Tax Accounting (4).** Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Wedeberg.
- B. A. 124, 126. Advanced Accounting (3, 3).** First and second semesters. Prerequisite, B. A. 111. Wedeberg.
- B. A. 125. C. P. A. Problems (3).** Second semester. Prerequisite, B. A. 124, or consent of instructor. Wedeberg.
- B. A. 127. Advanced Auditing Theory and Practice (3).** Second semester. Prerequisite, B. A. 122. Wright.

- B. A. 130. **Elements of Business Statistics** (3). First and second semesters. Laboratory fee, \$3.50. Ash.
- B. A. 131. **Statistics Laboratory**.
- B. A. 132, 133. **Advanced Business Statistics** (3, 3). First and second semesters. Prerequisite, B. A. 130. Laboratory fee, \$3.50. Ash.
- B. A. 140. **Financial Management** (3). Prerequisite, B. A. 21, Econ. 140. Calhoun.
- B. A. 141. **Investment Management** (3). First semester. Prerequisite, B. A. 140. Calhoun.
- B. A. 142. **Banking Policies and Practices** (3). Second semester. Prerequisite, Econ. 140.
- B. A. 143. **Credit Management** (3). Second semester. Prerequisite, B. A. 140. Calhoun.
- B. A. 147. **Business Cycles** (3). First semester. Prerequisite, Econ. 140. Dillard.
- B. A. 148. **Advanced Financial Management** (3). Prerequisite, B. A. 140.
- B. A. 149. **Analysis of Financial Statements** (3). Prerequisite, B. A. 140.
- B. A. 150. **Marketing Management** (3). Prerequisite, Econ. 150. Cook, Reid.
- B. A. 151. **Advertising Programs and Campaigns** (3). First semester. Prerequisite, B. A. 150. Raines.
- B. A. 152. **Advertising Copy Writing and Layout** (3). Second semester. Prerequisite, B. A. 151. Raines.
- B. A. 153. **Purchasing Management** (3). Second semester. Prerequisite, B. A. 150. Raines.
- B. A. 154. **Retail Store Management** (3). First semester. Prerequisite, Econ. 150. Cook.
- B. A. 155. **Problems in Retail Merchandising** (3). Prerequisite, B. A. 154. Cook.
- B. A. 157. **Foreign Trade Procedure** (3). Prerequisite, B. A. 150.
- B. A. 160. **Personnel Management** (3). Prerequisite, Econ. 160. Sylvester.
- B. A. 163. **Industrial Relations** (3). Second semester. Prerequisite, Econ. 160. Sylvester.
- B. A. 164. **Recent Labor Legislation and Court Decisions** (3). Second semester. Prerequisite, B. A. 160. Sylvester.
- B. A. 165. **Office Management** (3). First and second semesters. Patrick.
- B. A. 166. **Business Communications** (3). First and second semesters. Knapper.

- B. A. 167. Job Evaluation and Merit Rating (2). Prerequisite, B. A. 160. Hale.
- B. A. 168. Advanced Office Management (3). Second semester. Prerequisite, B. A. 165.
- B. A. 169. Industrial Management (3). Second semester. Prerequisites, B. A. 11 and 160.
- B. A. 170. Transportation Services and Regulation (3). Prerequisite, Econ. 32 or 37. Taff.
- B. A. 171. Industrial and Commercial Traffic Management (3). Prerequisite, B. A. 170. Taff.
- B. A. 172. Motor Transportation (3). Prerequisite, B. A. 170. Taff.
- B. A. 173. Overseas Shipping (3). Prerequisite, B. A. 170.
- B. A. 174. Commercial Air Transportation (3). Prerequisite, B. A. 170. Frederick.
- B. A. 175. Airline Administration (3). Prerequisite, B. A. 174. Frederick.
- B. A. 176. Problems in Airport Management (3). Prerequisite, B. A. 174. Frederick.
- B. A. 177. Motion Economy and Time Study (3). Prerequisite, B. A. 169. Hale.
- B. A. 178. Production Planning and Control (2). Prerequisite, B. A. 169. Hale.
- B. A. 179. Problems in Supervision (3). Prerequisite, B. A. 169. Hale.
- B. A. 180, 181. Business Law (4, 4). First and second semesters. Mounce.
- B. A. 184. Public Utilities (3). Prerequisites, Econ. 32 and 37. Clemens.
- B. A. 189. Business and Government (3). Second semester. Prerequisite, Econ. 32 or 37. Nelson.
- B. A. 190. Life Insurance (3). First semester. Prerequisite, Econ. 32 or 37. Watson.
- B. A. 191. Property Insurance (3). Second semester. Prerequisite, Econ. 32 or 37. Watson.
- B. A. 194. Insurance Agency Management (3). First semester. Prerequisite, B. A. 190 or 191. Watson.
- B. A. 195. Real Estate Principles (3). First semester. Prerequisite, Econ. 32 or 37. Watson.
- B. A. 196. Real Estate Finance (3). Second semester. Prerequisite, Econ. 32 or 37. Watson.
- B. A. 197. Real Estate Management (3). Second semester. Prerequisite, B. A. 195 or 196. Watson.

FOR GRADUATES

- B. A. 210. Advanced Accounting Theory (2, 3). Prerequisite, B. A. 111. Wedeberg, Fisher.
- B. A. 220. Managerial Accounting (3). Wedeberg, Wright.
- B. A. 221, 222. Seminar in Accounting. (Arranged.) Wedeberg, Wright.
- B. A. 226. Accounting Systems. Wedeberg, Sweeney.
- B. A. 228. Research in Accounting. (Arranged.) Wedeberg.
- B. A. 229. Studies of Special Problems in the Fields of Control and Organization. (Arranged).
- B. A. 240. Seminar in Financial Management (1-3). Prerequisite, B. A. 140. Calhoun, Fisher.
- B. A. 249. Studies of Special Problems in the Field of Financial Administration. (Arranged).
- B. A. 250. Problems in Sales Management (1-3). Cook, Reid.
- B. A. 251. Problems in Advertising (3). Raines.
- B. A. 252. Problems in Retail Store Management (3). Cook.
- B. A. 257. Seminar in Marketing Management. (Arranged). Cook, Raines, Reid.
- B. A. 258. Research in Marketing. (Arranged). Cook, Raines.
- B. A. 262. Seminar in Contemporary Trends in Labor Relations. (Arranged). Sylvester.
- B. A. 265. Development and Trends in Industrial Management (3). Sylvester.
- B. A. 266. Research in Personnel Management. (Arranged). Sylvester.
- B. A. 267. Research in Industrial Relations. (Arranged). Sylvester.
- B. A. 269. Studies of Special Problems in Employer-Employee Relationships. (Arranged). Sylvester.
- B. A. 270. Seminar in Air Transportation (3). Frederick.
- B. A. 271. Theory of Organization (3). Sylvester.
- B. A. 277. Seminar in Transportation (3). Frederick.
- B. A. 280. Seminar in Business and Government Relationships. (Arranged).
- B. A. 284. Seminar in Public Utilities (3). Clemens.
- B. A. 290. Seminar in Insurance (3). Watson.
- B. A. 295. Seminar in Real Estate (3). Watson.
- B. A. 299. Thesis. (Arranged). Staff.

CHEMICAL ENGINEERING

Professors Huff, Bonney; Associate Professors Klier, Smatko; Assistant Professor Gottschalk; Instructor Bilbrey.

This Department directs the programs of graduate students who plan to qualify for the degree of Master of Science or Doctor of Philosophy in Chemical Engineering or in Metallurgy.

Departmental regulations have been assembled for the guidance of candidates for graduate degrees in Chemical Engineering and in the Metallurgical Option. Copies of these regulations are available on request from the Department of Chemical Engineering.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Ch. E. 103 f,s. **Elements of Chemical Engineering** (3, 3). Three hours a week, both semesters. Prerequisites, Chem. 1, 3; Phys. 21; Math. 21. Huff, Smatko.
- Ch. E. 104. **Chemical Engineering Seminar** (1). One hour a week, both semesters. Prerequisite, permission of the Department. The contents of this course are constantly changing so a student may receive a number of credits by re-registering. Huff.
- Ch. E. 105 f,s. **Advanced Unit Operations** (5, 5). Two lectures and one all-day laboratory a week, both semesters. Prerequisites, Ch. E. 103 f,s; Chem. 187, 188, 189, 190. Laboratory fee, \$8.00 per semester. Bonney and Staff.
- Ch. E. 106 f,s. **Minor Problems** (6, 6). Laboratory fee, \$8.00.
- Ch. E. 107. **Fuels and Their Utilization** (3). Three hours a week, second semester. Prerequisite, Ch. E. 103 f,s, or permission of the department. Huff.
- C. E. 108 f,s. **Industrial Chemical Technology** (2, 2). Two hours a week, both semesters. Prerequisite, Ch. E. 3, or simultaneous registration therein, or permission of the department. Smatko.
- Ch. E. 109 f,s. **Chemical Engineering Thermodynamics** (3, 3). Two hours a week, both semesters. Prerequisites, Ch. E. 103 f,s; Chem. 187, 189, or permission of the department.
- Ch. E. 110. **Advanced Chemical Engineering Calculations** (3). Three hours a week, first semester. Prerequisites, Math. 20, 21; Ch. E. 103 f,s. Also given at Army Chemical Center. Bilbrey.
- Ch. E. 114. **Applications of Electrochemistry** (4). Three lecture hours and three laboratory hours a week, first semester. Prerequisite, consent of instructor. Laboratory fee, \$8.00. Smatko.
- Ch. E. 119. **Empirical Equations and Nomography** (3). Three hours a week, second semester. Prerequisite, consent of instructor. Also given at Army Chemical Center. Bilbrey.

- Ch. E. 164. Thermodynamics of Metallurgical Processes (3, 3).** Three lectures a week, both semesters. Prerequisites, Chem. 187, 189; Chem. 188, 190. Klier.
- Ch. E. 168, 170. Metallurgical Investigations (2, 4).** First semester, two three-hour laboratory periods a week; second semester, three lectures and one three-hour laboratory period a week. Prerequisites, Ch. E. 182, 183, or concurrent registration therein. Laboratory fee, \$8.00. Klier.
- Ch. E. 182, 183. Optical and X-ray Metallography (4, 4).** Three lectures and one laboratory a week, both semesters. Prerequisites, Ch. E. 64, 66; Ch. E. 68, 70, or permission of instructor. Laboratory fee, \$8.00. Klier.
- Ch. E. 188, 189. Alloy Steels I, II (2, 2).** Two lectures a week, both semesters. Ch. E. 188 is not prerequisite to Ch. E. 189. Offered at Office of Naval Research.

FOR GRADUATES

- Ch. E. 201. Graduate Unit Operations (5).** One hour conference, three or more three-hour laboratory periods a week, first semester. Prerequisite, permission of the department. Laboratory fee, \$8.00. Bonney.
- Ch. E. 202 f,s. Gas Analysis (3).** One lecture and two three-hour laboratory periods a week, one semester, to be arranged. Prerequisite, permission of the department. Laboratory fee, \$8.00. Bonney.
- Ch. E. 203. Graduate Seminar (1).** One hour a week, each semester. The content of this work is constantly changing, so a student may receive a number of credits by re-registering. Prerequisite, permission of the department. Also given at Army Chemical Center. Huff.
- Ch. E. 205. Research and Chemical Engineering and Metallurgy.** Prerequisites and credits to be arranged for individuals. Laboratory fee, \$8.00 per semester. Huff, Bonney, Smatko, Klier.
- Ch. E. 207 f,s. Plant Design Studies (3, 3).** Three hours a week, both semesters. Prerequisite, permission of the department. Also given at Army Chemical Center. Huff.
- Ch. E. 209 f,s. Plant Design Studies Laboratory (3, 3).** Three laboratory periods a week, both semesters. Prerequisite, permission of the department. Laboratory fee, \$8.00 per semester. Bonney.
- Ch. E. 210 f,s. Gaseous Fuels (2, 2).** Two hours a week, both semesters. Prerequisite, permission of the department. Huff.
- Ch. E. 214. Corrosion and Metal Protection (4).** Second semester. Four lecture hours a week. Prerequisites, Ch. E. 114 or Chem. 187, 189 or Chem. 188, 190, or consent of the instructor. Also given at the Army Chemical Center. Smatko.

- Ch. E. 216. Unit Processes of Organic Technology (3).** Three lectures a week, second semester. Prerequisite, permission of the Department. Smatko.
- Ch. E. 217. Unit Processes of Organic Technology Laboratory (2).** Two or more laboratory periods a week, second semester. Prerequisite, permission of the instructor. Laboratory fee, \$8.00. Bonney, Smatko.
- Ch. E. 220, 221. Solid Phase Reactions (3, 3).** Both semesters. Prerequisites, Chem. 187; Chem. 188, 190; Ch. E. 182, 183; or permission of the instructor. Klier.
- Ch. E. 224, 225. Advanced X-ray Metallography (3, 3).** Two lectures and one laboratory period a week, both semesters. Prerequisites, Math 114, 115; Ch. E. 182, 183. Laboratory fee, \$8.00. Klier.
- Ch. E. 228. Seminar in Metallurgy (1).** One meeting a week, both semesters. Required of Graduate students in metallurgical curriculum. The content of this course is constantly changing so a student may earn a number of credits by re-registering. Klier.
- Ch. E. 229. Gases in Metals (2).** Two lectures a week, second semester. Prerequisites, Ch. E. 182, 183, or permission of instructor. Klier.
- Ch. E. 230, 231. Mechanical Metallurgy (3, 3).** Three lectures a week, both semesters. Prerequisites, Math. 114, 115; Ch. E. 182, 183. Klier.
- Ch. E. 232, 233. Advanced Physical Metallurgy (3, 3).** Three lectures a week, both semesters. Required of graduate students in metallurgical curriculum. Offered at the Navy Department.
- Ch. E. 240, 241. Advanced Heat Transmission (2, 2).** Two lectures a week, both semesters. Elective of graduate students in chemical engineering and others. Prerequisite, permission of the Department. Offered at the Army Chemical Center. Gottschalk.
- Ch. E. 250. Chemical Engineering Practice (6).** Four hours conference and forty hours a week of work in laboratory and plant for eight weeks. Prerequisite, permission of the Department. Offered at the Army Chemical Center only.
- Ch. E. 270. Plastics Technology (3).** Two lectures and one laboratory a week, first semester. Prerequisite, permission of the Department. Laboratory fee, \$8.00. Smatko.
- Ch. E. 280. Graduate Chemical Engineering Thermodynamics (3).** Three lectures a week, second semester. Prerequisites, Ch. E. 109, f,s; Ch. E. 110; or permission of instructor.

CHEMISTRY

Professors Drake, Reeve, Svirbely, White, Woods; Research Professors Bailey, Michels, Shepard, Slawsky; Associate Professors Pickard, Pratt, Rollinson, Schamp, Spurr, Story, Stuntz, Veitch, Wiley; Assistant Professors Aldridge, Brown, Carruthers, Dewey, Jansen; Research Associate Seigel.

Departmental regulations have been assembled for the guidance of candidates for graduate degrees. Copies of these regulations are available from the Department of Chemistry.

Laboratory fees in Chemistry are \$10.00 per laboratory course per semester.

A. Analytical Chemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Chem. 166, 167. Food Analysis (3, 3). One lecture and two three-hour laboratory periods per week, first and second semesters. Prerequisites, Chem. 19, 31, 32, 33, 34. Wiley.

FOR GRADUATES

Chem. 206, 208. Spectographic Analysis (1, 1). One three-hour laboratory a week. Prerequisite, Chem. 188, 190, and consent of the instructor. Registration limited. White.

Chem. 221, 223. Chemical Microscopy (2, 2). One lecture and three one-hour laboratory periods a week, first and second semesters. Registration limited. Prerequisite, consent of instructor. Stuntz.

Chem. 225. Polarography (2). Two lectures a week.

Chem. 226, 228. Advanced Quantitative Analysis (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of instructor. Stuntz.

Chem. 266. Biological Analysis (2). Two three-hour laboratory periods a week, second semester. Prerequisites, Chem. 19, 31, 32, 33, 34. Wiley.

B. Biochemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Chem. 161, 163. Biochemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, Chem. 31, 33, or Chem. 35, 37.

Chem. 162, 164. Biochemistry Laboratory (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 32, 34, or Chem. 36, 38.

FOR GRADUATES

- Chem. 261, 263. Advanced Biochemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, Chem. 141, 143, or consent of instructor. Veitch.
- Chem. 262, 264. Advanced Biochemistry Laboratory (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of the instructor. Veitch.
- Chem. 205. Enzymes (2). Two lectures a week, first semester. Prerequisites, Chem 161, 163. Veitch.
- Chem. 268. Special Problems in Biochemistry (2-4). Two to four three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 161, 162, 163, 164, and consent of the instructor. Veitch.

C. Inorganic Chemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 101. Advanced Inorganic Chemistry (2). Two lectures a week, second semester. Prerequisites, Chem. 23 and 37, 38.

FOR GRADUATES

- Chem. 201, 203. The Chemistry of The Rarer Elements (2, 2). Two lectures a week, first and second semesters. White.
- Chem. 202, 204. Advanced Inorganic Laboratory (2). Two three-hour laboratory periods a week, first and second semesters.
- Chem. 205. Radiochemistry (2). Two lectures a week. Rollinson.
- Chem. 207. Chemistry of Coordination Compounds (2). Two lectures a week. Rollinson.
- Chem. 209. Non-aqueous Inorganic Solvents (2). Two lectures a week, first or second semester. Story.
- Chem. 210. Radiochemistry Laboratory (1 or 2). One or two four-hour laboratory periods a week. Registration limited. Prerequisites, Chem. 205 (or concurrent registration therein) and consent of instructor. Rollinson.
- Chem. 239. Physical Techniques in Chemistry (2).

D. Organic Chemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 141, 143. Advanced Organic Chemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, Chem. 37, 38.
- Chem. 142, 144. Advanced Organic Laboratory (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 37, 38.

Chem. 146, 148. The Identification of Organic Compounds (2, 2). Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 141, 143, or concurrent registration therein.

Chem. 150. Organic Quantitative Analysis (2). Two three-hour laboratory periods per week, first and second semesters. Prerequisite, consent of instructor.

FOR GRADUATES

(One or more courses from the following group 241-254 will customarily be offered each semester. Two of these courses will be presented in the academic year 1953-1954.)

Chem. 240. Organic Chemistry of High Polymers (2). Two lectures a week, first semester. Prerequisites, Chem. 141, 143. Bailey.

Chem. 241. Stereochemistry (2). Two lectures a week. Woods.

Chem. 243. The Chemistry of Petroleum Processing (2). Two lectures a week, second semester. Prerequisites, Chem. 141, 143, 187, 189.

Chem. 245. The Chemistry of the Steroids (2). Two lectures a week. Pratt.

Chem. 249. Physical Aspects of Organic Chemistry (2). Two lectures a week. Woods.

Chem. 251. The Heterocyclics (2). Two lectures a week. Pratt.

Chem. 253. Organic Sulfur Compounds (2). Two lectures a week. Dewey.

Chem. 254. Advanced Organic Preparations (2 to 4). Two to four three-hour laboratory periods a week, first and second semesters. Pratt.

Chem. 258. The Identification of Organic Compounds, an Advanced Course (2 to 4). Two to four three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 141, 143, or concurrent registration therein. Pratt.

E. Physical Chemistry

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Chem. 181, 183. Elements of Physical Chemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, Chem. 19; Phys. 1, 2; Math. 10, 11.

Chem. 182, 184. Elements of Physical Chemistry Laboratory (1, 1). One three-hour laboratory period a week, first and second semesters. May be taken ONLY when accompanied by Chem. 181, 183.

Chem. 187, 189. Physical Chemistry (3, 3). Three lectures a week, first and second semesters. Prerequisites, Chem. 19 or 21; Phys. 20, 21; Math. 20, 21. This course must be accompanied by Chem. 188, 190.

Chem. 188, 190. Physical Chemistry Laboratory (2, 2). Two three-hour laboratory periods a week, first and second semesters. A laboratory course for students taking Chem. 187, 189.

Chem. 192, 194. Glassblowing Laboratory (1, 1). One three-hour laboratory period a week, first and second semesters. Prerequisite, consent of instructor. Carruthers.

FOR GRADUATES

The common prerequisites for the following courses are Chem. 187, 189, and 188, 190, or their equivalents.

One or more courses of the group, 281-323, will be offered each semester, depending on demand.

Chem. 281, 283. Theory of Solutions (2, 2). Two lectures a week, first and second semesters. Prerequisite, Chem. 307. Svirbely.

Chem. 285. Colloid Chemistry (2). Two lectures a week. Pickard.

Chem. 287. Infra-red and Raman Spectroscopy (2). Two lectures a week second semester. Prerequisites, Chem. 141, 143, 187, 189. Spurr.

Chem. 289. Selected Topics in Advanced Colloid Chemistry (2). Two lectures a week, first or second semester. Prerequisite, Chem. 285. Pickard.

Chem. 295. Heterogenous Equilibria (2). Two lectures a week. Pickard.

Chem. 299. Reaction Kinetics (3). Three lectures per week. Svirbely.

Chem. 303. Electrochemistry (3). Three lectures a week. Pickard.

Chem. 304. Electrochemistry Laboratory (2). Two three-hour laboratory periods a week. Prerequisite, consent of instructor. Staff.

Chem. 307. Chemical Thermodynamics (3). Three lectures a week. Svirbely.

Chem. 311. Physicochemical Calculations (2). Two lectures a week. Pickard.

Chem. 313. Molecular Structure (2). Two lectures a week, first semester. Brown.

Chem. 315. Molecular Structure (2). Two lectures a week, second semester. Spurr.

Chem. 317. Chemical Crystallography. (3). First semester. Three lectures per week. Prerequisite, consent of Instructor.

Chem. 321. Quantum Chemistry (3). Three lectures a week. Brown.

Chem. 323. Statistical Mechanics and Chemistry (3). Three lectures a week. Brown.

F. Seminar and Research

Chem. 351. Seminar (1). First and second semesters. Staff.

Chem. 360. Research. First and second semesters, summer session. Staff.

CIVIL ENGINEERING

Professors Steinberg, Allen, Otts; Lecturer Walker; Associate Professors Barber, Cournyn, Gohr, Keller; Assistant Professors Piper, Wedding; Instructor Luce.

The Civil Engineering Department offers graduate work in the following fields: highways, hydraulics, soils and foundations, structures, and sanitary engineering, leading to the degree of Master of Science.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- C. E. 100. **Theory of Structures** (4). Three lectures and one laboratory period a week, second semester. Prerequisite, Mech. 50. Allen, Piper.
- C. E. 101. **Soil Mechanics** (3). Two lectures and one laboratory period a week, first semester. Prerequisites, Mech. 50 and 53. Barber.
- C. E. 102. **Structural Design** (6). Five lectures and one laboratory period a week, first semester. Prerequisite, C. E. 100. Allen.
- C. E. 103. **Concrete Design** (6). Five lectures and one laboratory period a week, second semester. Prerequisite, C. E. 100. Allen.
- C. E. 104. **Water Supply** (3). Two lectures and one laboratory period a week, first semester. Prerequisite, C. E. 50. Otts.
- C. E. 105. **Sewerage** (3). Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 50. Otts.
- C. E. 106. **Elements of Highways** (3). Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 101. Barber, Gohr.
- C. E. 107. **Statically Indeterminate Structures** (3, 3). First and second semesters. Prerequisite, C. E. 100 or equivalent. Allen, Keller.
- C. E. 108. **Photogrammetry** (3). Two lectures and one laboratory period a week, second semester. Prerequisite, Surv. 50. Gohr.
- C. E. 109. **Hydrology** (3). Two lectures and one laboratory a week, first semester. Prerequisite, C. E. 50. Cournyn.

FOR GRADUATES

- C. E. 200. **Advanced Properties of Materials** (3). First or second semester. Prerequisite, Mech. 53 or equivalent. Wedding.
- C. E. 201. **Advanced Strength of Materials** (3). First or second semester. Prerequisites, Mech. 50, 51 or equivalent. Keller.
- C. E. 202. **Experimental Stress Analysis** (3). Two lectures and one laboratory period a week, first or second semester. Keller.

- C. E. 203. Soil Mechanics (3). First or second semester. Prerequisite, C. E. 101 or equivalent. Barber.
- C. E. 204. Advanced Foundations (3). First or second semester. Prerequisites, C. E. 101, 102 and 103 or equivalent. Barber.
- C. E. 205. Highway Engineering (3). First or second semester. Prerequisite, C. E. 106 or equivalent. Barber, Gohr.
- C. E. 206. Theory of Concrete Mixtures (3, 3). First and second semesters. Prerequisite, Mech. 53 or equivalent. Walker.
- C. E. 207. Advanced Structural Analysis (3). Two lectures and one laboratory period a week, first semester. Prerequisites, C. E. 102, 103, or equivalent. Keller.
- C. E. 208. Advanced Sanitation (3). First or second semester. Ottts.
- C. E. 209. Advanced Water Supply (3). First or second semester. Prerequisite, C. E. 104 or equivalent. Ottts.
- C. E. 210. Advanced Sewerage (3). First or second semester. Prerequisite, C. E. 105 or equivalent. Ottts.
- C. E. 211. Sanitary Engineering Design (3). First or second semester. Prerequisites, C. E. 104, 105 or equivalent. Ottts.
- C. E. 212. Research. Credit in accordance with work done. First and second semesters. Staff.
- C. E. 213. Seminar. First or second semester. Credit in accordance with work outlined by the civil engineering staff. Staff.
- C. E. 214. Sanitary Engineering Laboratory (3). First or second semester. Prerequisite, C. E. 104 and C. E. 105 or equivalent. Ottts.
- C. E. 215. Sanitary Engineering Laboratory (3). First or second semester. Prerequisite, C. E. 104 and 105 or equivalent. Ottts.
- C. E. 216. Hydraulic Engineering (3). First or second semester. Prerequisite, C. E. 50 or equivalent. Cournyn.
- C. E. 217. Hydraulic Machinery (3). First or second semester. Prerequisite, C. E. 50 or equivalent. Cournyn.
- C. E. 218. Advanced Structural Design (3). Second semester. Prerequisite, C. E. 102, 103 or equivalent. Allen.
- C. E. 219. Sanitary Engineering Design (3). First or second semester. Prerequisite, C. E. 104, 105 or equivalent. Ottts.
- C. E. 220. Soil Mechanics Laboratory (3). One lecture and two laboratory periods a week, first or second semester. Prerequisite, C. E. 101 or equivalent. Barber.

COMPARATIVE LITERATURE

Professors Aldridge, Falls, Goodwyn, Harman, Murphy, Prahl, Zucker; Lecturer McManaway; Associate Professors Cooley, Manning, Mooney, Weber, Zeeveld; Assistant Professors Andrews, Gravely, Parsons.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Comp. Lit. 101, 102. Introductory Survey of Comparative Literature (3, 3). First and second semester. Zucker.

Comp. Lit. 103. The Old Testament as Literature (3). Second semester. Zucker.

Comp. Lit. 105. Romanticism in France (3). First semester. Parsons.

Comp. Lit. 106. Romanticism in Germany (3). Second semester. Prahl.

Comp. Lit. 107. The Faust Legend in English and German Literature (3). First semester. Prahl.

Comp. Lit. 112. Ibsen (3). First semester. Zucker.

Comp. Lit. 114. The Greek Drama (3). First semester. Prahl.

Comp. Lit. 125. Literature of the Middle Ages. Cooley.

In addition, the following courses will count as credit in Comparative Literature: Eng. 104, Eng. 113, Eng. 121, Eng. 129, 130, Eng. 144, Eng. 145, Eng. 155, 156, Eng. 157; Span. 109; Speech 131, 132.

FOR GRADUATES

Comp. Lit. 258. Folklore in Literature (3). Second semester. Goodwyn.

The following courses will count as credit in Comparative Literature: Eng. 201, Eng. 204, Eng. 206, 207, Eng. 216, 217, Eng. 227, 228; Ger. 203, Ger. 204, Ger. 208.

DAIRY

Professors Pou, Shaw, Arbuckle; Assistant Professors Mattick, Keeney; Instructors Brown, Corbin.

The Dairy Department offers work leading to the degrees of Master of Science and Doctor of Philosophy. Candidates for the Doctor of Philosophy degree have the option of studying in one of two major fields; Dairy Production, which is concerned with breeding, nutrition and physiology of dairy animals, or Dairy Technology, which is concerned with the chemical, bacteriological and nutritional aspects of dairy products, as well as the practical industrial phases of milk processing. Doctoral candidates must satisfactorily complete work, or its equivalent, in courses carrying graduate credit: Bacteriology, to include Dairy, Food, Pathogenic and Bacterial Metabolism (14 hours); Chemistry, to include

Organic, Biological, Physical and Colloidal (18 hours); Nutrition (8 hours). In addition, doctoral candidates majoring in Dairy Production must have a minimum of 12 hours in physiology.

Dairy 101. Dairy Production (3). Two lectures and one laboratory period a week, second semester. Prerequisites, Dairy 1 and A. H. 110. Pou.

Dairy 105. Dairy Cattle Breeding (3). Two lectures and one laboratory period a week, first semester. Prerequisites, Dairy 1, Zool. 104 and A. H. 120.

Pou.

Dairy 108. Dairy Technology (4). Two lectures and two laboratory periods a week, first semester. Prerequisites, Dairy 1, Bact. 133, Chem. 1, 3. Laboratory fee, \$3.00. Mattick.

Dairy 109. Market Milk (4). Two lectures and two laboratory periods a week, first semester. Prerequisites, Dairy 1, Bact. 133, Chem. 1, 3. Laboratory fee, \$3.00. Arbuckle.

Dairy 110. Butter and Cheese Making (3). One lecture and one five-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Prerequisites, Dairy 1, Bact. 1, Chem. 1, 3. (Alternative years, not given in 1953-1954.) Mattick.

Dairy 111. Concentrated Milk Products (3). One lecture and one five-hour laboratory period a week, second semester. Prerequisites, Dairy 108, 114. Alternate years, given in 1953-1954. Laboratory fee, \$3.00. Mattick.

Dairy 112. Ice Cream Making (4). Two lectures and two laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisites, Dairy 108. Arbuckle.

Dairy 114. Special Laboratory Methods (3). Two lectures and two laboratory periods a week, second semester. Prerequisites, Dairy 108, Bact. 133, Chem. 19, 31, 32, 33, 34. Laboratory fee, \$3.00. Keeney.

Dairy 115. Dairy Inspection (2)—First semester. One lecture and one laboratory period a week. Prerequisite, Dairy 109.

Study and interpretation of dairy ordinances and standards; application to farm and plant inspection. Mattick.

Dairy 116. Dairy Plant Management (3)—Second semester. Three lecture periods a week. Prerequisites, at least three advanced dairy products technology courses.

Principles of dairy plant management, record systems; personnel, plant design and construction; dairy machinery and equipment. Mattick.

Dairy 201. Advanced Dairy Production (3). First semester. Prerequisite, Dairy 101, or equivalent. Staff.

Dairy 202. Advanced Dairy Technology (3). First semester. Prerequisites, Dairy 108, 114, or equivalent. Keeney.

- Dairy 203. Physiology of Milk Secretion (3).** Two lectures and one laboratory period a week, second semester. Prerequisites, A. H. 111, and consent of instructor. Shaw.
- Dairy 204. Special Problems in Dairying (1-5).** First and second semesters. Prerequisite, permission of professor in charge of work. Staff.
- Dairy 205. Seminar (1).** First and second semesters. Staff.
- Dairy 206. Animal Nutrition Seminar (1).** Second semester. Prerequisites, permission of instructor. Shaw.
- Dairy 208. Research (3-8).** Credit to be determined by amount and quality of work done. Staff.

ECONOMICS

Professors Dillard, Gruchy; Associate Professor Grayson; Assistant Professors Cole, Hamberg, Longley, Root; Instructors Measday, Norton, Robinson, Yeager.

This Department offers both the Master of Arts and the Doctor of Philosophy degrees. The latter degree is offered in collaboration with the Department of Business Administration, and prospective doctoral students should consult with both that Department and the Department of Economics in planning their courses of study.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Econ. 131. Comparative Economic Systems (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Gruchy.
- Econ. 132. Advanced Economic Principles (3).** First and second semesters. Prerequisite, Econ. 32. Grayson.
- Econ. 134. Contemporary Economic Thought (3).** Second semester. Prerequisite, Econ. 32. Gruchy.
- Econ. 136. International Economic Policies and Relations (3).** First semester. Prerequisite, Econ. 32 or 37. Root.
- Econ. 137. The Economics of National Planning (3).** First semester. Prerequisite, Econ. 32 or 37. Gruchy.
- Econ. 140. Money and Banking (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Staff.
- Econ. 141. Theory of Money, Credit, and Prices (3).** Second semester. Prerequisites, Econ. 32 and 140. Dillard.
- Econ. 142. Public Finance and Taxation (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Grayson.
- Econ. 149. International Finance and Exchange (3).** Second semester. Prerequisite, Econ. 140. Econ. 136 recommended. Root.

- Econ. 150. Marketing Principles and Organization (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Reid and Staff.
- Econ. 160. Labor Economics (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Staff.
- Econ. 170. Monopoly and Competition (3).** Second semester. Prerequisite, Econ. 32 or 37.
- Econ. 171. Economics of American Industries (3).** First and second semesters. Prerequisite, Econ. 32 or 37. Clemens.

FOR GRADUATES

- Econ. 200. Micro-Economic Analysis (3).** Second semester. Prerequisite, Econ. 132 or equivalent. Grayson.
- Econ. 202. Macro-Economic Analysis (3).** First semesters. Prerequisite, Econ. 132. Recommended Econ. 141. Dillard.
- Econ. 230. History of Economic Thought (3).** First semester. Prerequisite, Econ. 132 or consent of instructor. Dillard.
- Econ. 231. Economic Theory in the Nineteenth Century (3).** Second semester. Prerequisite, Econ. 230 or consent of instructor. Dillard.
- Econ. 232, 233. Seminar in Institutional Economic Theory (3, 3).** First and second semesters. Prerequisite, Econ. 132 or consent of instructor. Gruchy.
- Econ. 236. Seminar in International Economic Relations (3).** Root.
- Econ. 237. Seminar in Economic Investigation (3).**
- Econ. 270. Seminar in Economics and Geography of American Industries (3).** Clemens.
- Econ. 299. Thesis.** Arranged. Staff.

EDUCATION

Professors Brechbill, Brown, Cotterman, Devilbiss, Hornbake, McNaughton, Mershon, Mohr, Morgan, Newell, Prescott, Schindler, Van Zwoll, Wiggin; Associate Professors Bryan, Byrne, Kurtz, Maley, Patrick, Perkins, Woods; Assistant Professors Beatty, Greene, Gordon, Spencer, Thompson, Waetjen; Instructors Denecke, Kemble, Tierney, Patterson.

The Department of Education offers Graduate School programs leading toward the Master of Arts, Master of Education, Doctor of Philosophy, and Doctor of Education degrees.

MASTER OF ARTS AND MASTER OF EDUCATION

A student in Education has the option of qualifying for the degrees of Master of Arts or for the degree of Master of Education.

In addition to the general requirements for admission to the Graduate School, applicants for unconditional admission with a major in Education must have had sixteen semester hours of undergraduate work in Education of acceptable quality, equivalent in character to the work in the junior and senior years of the University of Maryland. The Education Committee on Masters' Programs may interpret this requirement so that foundation work in fields other than education may be accepted in cases of graduate students not preparing for school work.

The time limit for completing either degree is the same as that prescribed for the Master of Arts and the Master of Science degrees of the Graduate School.

A qualifying written examination is required of all candidates for a degree, to be taken after the student has successfully completed at least 12 semester hours of satisfactory graduate work. This examination covers the student's major area of work for the degree. Following is a list of the areas in which this examination may be taken:

Adult Education	Higher Education
Business Education	History and Philosophy of Education
Comparative Education	Home Economics Education
Educational Administration and Supervision	Secondary School Curriculum and Instruction
Elementary School Curriculum and Instruction	Human Growth and Development
Guidance and Personnel	Industrial Arts Education
Health, Physical Education, and Recreation	Nursing Education
	Vocational Industrial Education

To assist in the choice of reading in preparation for the examination, reading lists in the several areas are available from the professor in charge of the area. No student is recommended to the Graduate Council for advancement to candidacy until he has successfully passed the qualifying examination. Currently the examination is administered on the third Saturday of January and May and on the Saturday preceding the last week of the Summer Session at College Park only.

Candidates for the degree of Master of Education who are high school teachers not preparing for administrative positions are advised to take at least 12 semester hours in their subject fields. Students who desire to qualify for a secondary school principalship in Maryland should take one third of their graduate work in fields other than education.

DOCTOR OF PHILOSOPHY AND DOCTOR OF EDUCATION

Each candidate is required to achieve exceptional ability in at least one major area and one minor area of competence. The minor may consist of a single area or of a group of related courses. Areas related to the major and minor may be included also if desired. The choice of specific areas is optional with the student and his faculty adviser.

The candidate should choose his major area from the following list, except that the doctorate majors are not available in Business Education and Home Economics Education. Minors may be chosen from this list or from fields other than Education.

Adult Education	History, Philosophy and Comparative Education
Curriculum and Instruction	Human Growth and Development
Educational Administration and Supervision	Physical Education, Recreation, and Health
Elementary Education	Research Principles and Techniques
Guidance and Personnel	Secondary Education
Higher Education	Vocational-Industrial Education

In addition to the general University requirements for a Doctor's degree the following additional requirements must be met by students proposing to major in one of the above fields.

1. The preliminary examination for admission to candidacy for the Doctor's degree will cover the student's preparation in major and minor fields, and will include such other examinations as may be required by the faculty. A student must be admitted to candidacy in order to have the department's official permission to be a candidates for a Doctor's degree.

2. A comprehensive examination covering the general fields of major and minor study must be passed by each candidate, after which the final examination is administered by a committee appointed by the Dean of the Graduate School.

3. In order to meet the residence requirements, a candidate for the Ph.D. degree must spend at least two semesters in full-time study on the College Park campus.

In general the requirements for the Doctor of Education degree are the same as those for the degree Doctor of Philosophy. The most important difference between the two degrees are as follows:

1. The purpose of the Doctor of Education degree is to prepare persons of exceptional competence to work in the field. The emphasis for this degree is placed on broad understanding, whereas that for the degree of Doctor of Philosophy is placed on specialized research.

2. A reading knowledge of foreign languages is required for the degree of Doctor of Education only when needed for research and study in the doctoral program.

3. In meeting residence requirements, a candidate for the Ed.D. degree may substitute two summers of residence for one semester of residence, or four summers for two semesters.

4. The doctoral study for the Ed.D. consists of a project rather than a dissertation. The project requires research to meet a practical field problem. Credit of six to nine hours is allowed for a project as compared with twelve to eighteen hours for a Ph.D. dissertation.

A. History, Principles, Curriculum, and Administration

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Ed. 100. History of Education I (2). First semester. Wiggin.
- Ed. 101. History of Education II (2). Wiggin.
- Ed. 102. History of Education in the United States (2). Second semester. Wiggin.
- Ed. 105. Comparative Education—European (2). First semester. Wiggin.
- Ed. 106. Comparative Education—Latin America (2). Second semester.
- Ed. 107. Philosophy of Education (2).
- Ed. 121. The Language Arts in the Elementary School (2).
- Ed. 122. The Social Studies in the Elementary School (2).
- Ed. 123. The Child and the Curriculum (2).
- Ed. 124. Arithmetic in the Elementary Schools (2).
- Ed. 125. Creative Expression in the Elementary School (2).
- Ed. 126. The Elementary School Curriculum (2).
- Ed. 127. Teaching in Elementary Schools (2-6).
- *Ed. 130. Theory of the Junior High School (2).
- *Ed. 131. Theory of the Senior High School (2).
- Ed. 133. Methods of Teaching the Social Studies (2). (Offered in Baltimore.)
- Ed. 134. Materials and Procedure for the High School Core Curriculum (2).
- Ed. 137. Science in the Junior High School (2). Laboratory fee, \$2.00.
- Ed. 140. Curriculum, Instruction, and Observation (3). Staff.
Graduate credit is allowed only by special permission. Separate sections are offered in the following subject-matter areas: English, Social Studies, Foreign Languages, Science, Mathematics, Art Education, Business Education, Industrial Education, Music Education, Nursing Education, Physical Education for Men, and Physical Education for Women.
- Ed. 141. High School Course of Study—English (2). Bryan.
- Ed. 142. High School Course of Study—Literature (2). Bryan.
- Ed. 145. Principles of High School Teaching (2-3). First and second semesters. Brechbill.

*Credit is accepted for Ed. 130 or for Ed. 131, but not for both courses.

- Ed. 147. Audio-Visual Education (2). First semester. Laboratory fee, \$1.00.
- Ed. 150. Educational Measurement (2). First and second semesters.
- Ed. 151. Remedial Reading Instruction (2). Schindler.
- Ed. 152. The Adolescent: Characteristics and Problems (2).
- Ed. 153. The Improvement of Reading (2).
- Ed. 160. Educational Sociology—Introductory (2).
- Ed. 161. Principles of Guidance (2). First and second semesters. Byrne.
- Ed. 162. Mental Hygiene in the Classroom (2).
- Ed. 163, 164, 165. Community Study Laboratory I, II and III (2, 2, 2).
- Ed. 170. Introduction to Special Education (2).
- Ed. 171. Education of Retarded and Slow-Learning Children (2).
- Ed. 188. Special Problems in Education (1-3).
- Ed. 191. Principles of Adult Education (2). Wiggin.

FOR GRADUATES

- Ed. 202. The Junior College (2).
- Ed. 203. Problems in Higher Education (2).
- Ed. 205. Seminar in Comparative Education (2).
- Ed. 207. Seminar in History and Philosophy of Education (2). Wiggin.
- Ed. 210. The Organization and Administration of Public Education (2). First semester. Newell.
- Ed. 211. The Organization, Administration, and Supervision of Secondary Schools (2). Second semester. Newell.
- Ed. 212. School Finance and Business Administration (2). VanZwoll.
- Ed. 214. School Buildings and Equipment (2). VanZwoll.
- Ed. 215. Public Education in Maryland (2).
- Ed. 216. High School Supervision (2). Laboratory fee, \$1.00. Newell.
- Ed. 217. Administration and Supervision in Elementary Schools (2).
- Ed. 218. School Surveys (2-6). Newell.
- Ed. 219. Seminar in School Administration (2). VanZwoll.
- Ed. 220. Pupil Transportation (2).

- Ed. 222. Seminar in Supervision (2).
- Ed. 223. Practicum in Personnel Relationships (2-6). Newell.
- Ed. 224. Internship in School Administration (12-16). Newell.
- Ed. 225. School Public Relations (2). VanZwoll.
- Ed. 226. Child Accounting (2). VanZwoll.
- Ed. 227. Public School Personnel Administration (2). VanZwoll.
- Ed. 229. Seminar in Elementary Education (2). Schindler.
- Ed. 230. Elementary School Supervision (2).
- Ed. 232. Student Activities in the High School (2).
- Ed. 235. Curriculum Development in Elementary Schools (2).
- Ed. 236. Curriculum Development in the Secondary School (2).
- Ed. 239. Seminar in Secondary Education (2).
- Ed. 242. Coordination in Work-Experience Programs (2). Brown.
- Ed. 243. Application of Theory and Research to Arithmetic in Elementary Schools (2). Schindler.
- Ed. 244. Application of Theory and Research to the Language Arts in Elementary Schools (2). Schindler.
- Ed. 245. Applications of Theory and Research to High School Teaching (2).
- Ed. 246. Applications of Theory and Research to the Social Studies in Elementary Schools (2).
- Ed. 247. Seminar in Science Education (2).
- Ed. 248. Seminar in Industrial Arts and Vocational Education (2). Hornbake.
- Ed. 250. Analysis of the Individual (2). First semester. Byrne.
- Ed. 253. Guidance Information (2). Second semester. Byrne.
- Ed. 260. Principles of School Counseling (2). First semester. Prerequisites, Ed. 161, 250, 253 for majors. Prerequisites may be waived by instructor. Bryne.
- Ed. 261. Case Studies in Counseling (2). Second semester. Prerequisite, Ed. 260. Byrne.
- Ed. 263, 264. Aptitudes and Aptitude Testing (2, 2). (Offered in Baltimore.)
- Ed. 267. Curriculum Construction Through Community Analysis (2). Schindler.
- Ed. 268. Seminar in Educational Sociology (2).

- Ed. 269. Seminar in Guidance (2). Second semester. Registration only on approval of instructor. Byrne.
- Ed. 278. Seminar in Special Education (2).
- Ed. 279. Seminar in Adult Education (2).
- Ed. 280. Research Methods and Materials in Education (2).
- Ed. 281. Source Materials in Education (2).
- Ed. 288. Special Problems in Education (1-6). First and second semesters. Staff.
- Ed. 289. Research—Thesis (1-6). First and second semesters. Staff.
- Ed. 291. Administrative Direction of Special Curricular Fields (2).

B. Business Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- B. Ed. 101. Methods and Materials in Teaching Office Skills (2).
- B. Ed. 102 Methods and Materials in Teaching Bookkeeping and Related Subjects (2).
- B. Ed. 103. Basic Business Subjects in the Junior High School (2).
- B. Ed. 104. Basic Business Education in the Secondary Schools (2).

FOR GRADUATES

- B. Ed. 200. Administration and Supervision of Business Education (2).
- B. Ed. 255. Principles and Problems of Business Education (2). Patrick.
- B. Ed. 256. Curriculum Development in Business Education (2-6).

C. Childhood Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- C. Ed. 100. Child Development I—Infancy (3). First semester. McNaughton.
- C. Ed. 101. Child Development II—Early Childhood (3). Second semester. McNaughton.
- C. Ed. 102. Child Development III—The Child from 5 to 10 (2). First and second semesters.
- C. Ed. 110. Child Development IV (3). First and second semesters. Laboratory fee, \$1.00.
- C. Ed. 113. Education of the Young Child I (2). McNaughton.

- C. Ed. 114. Education of the Young Child II—The Social and Emotional Needs of the Young Child (2). McNaughton.
- C. Ed. 115. Children's Activities and Activities Materials (3). Laboratory fee, \$5.00. Second semester.
- C. Ed. 116, 117. Creative Expressions; Art, Music, Dance (2-3, 2-3).
- C. Ed. 119. Curriculum, Instruction, and Observation—Cooperative Nursery School (2-3).
- C. Ed. 140. Curriculum, Instruction, and Observation—Nursery School (3). First and second semesters.
- C. Ed. 145. Guidance in Behavior Problems (2). First semester.
- C. Ed. 150. Curriculum, Instruction, and Observation—Kindergarten (2-3). Second semester.
- C. Ed. 165. Leadership Training (2).

D. Home Economics Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- H. E. Ed. 102. Problems in Teaching Home Economics (3). First semester. Spencer.
- H. E. Ed. 120. Evaluation of Home Economics (2). Spencer.
- H. E. Ed. 140. Curriculum, Instruction, and Observation (3). Second semester. Spencer.

FOR GRADUATES

- H. E. Ed. 200. Seminar in Home Economics Education (2). Spencer.
- H. E. Ed. 202. Trends in the Teaching and Supervision of Home Economics. Spencer.

E. Human Development Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- H. D. Ed. 100, 101. Principles of Human Development I and II (3, 3).
- H. D. Ed. 102, 103, 104. Child Development Laboratory I, II and III (2, 2, 2).
- H. D. Ed. 112, 114, 116. Scientific Concepts in Human Development I, II, III, (3, 3, 3).
- H. D. 113, 115, 117. Laboratory in Behavior Analysis 1, II, III, (3, 3, 3).

FOR GRADUATES

- H. D. Ed. 200. Introduction to Human Development and Child Study (3).
- H. D. Ed. 201. Biological Bases of Behavior (3).
- H. D. Ed. 202. Social Bases of Behavior (3).
- H. D. Ed. 203. Integrative Bases of Behavior (3).
- H. D. Ed. 204, 205. Physical Processes in Human Development (3, 3).
- H. D. Ed. 206, 207. Socialization Processes in Human Development I, II (3, 3).
- H. D. Ed. 208, 209. Self Processes in Human Development I and II (3, 3).
- H. D. Ed. 210. Affectional Relationships and Processes in Human Development (3).
- H. D. Ed. 211. Peer-culture and Group Processes in Human Development (3).
- H. D. Ed. 212, 214, 216. Advanced Scientific Concepts in Human Development I, II, III (3, 3, 3).
- H. D. Ed. 213, 215, 217. Advanced Laboratory in Behavior Analysis I, II, III (3, 3, 3).
- H. D. Ed. 218. Workshop in Human Development (6). Prerequisites, H. D. Ed. 212, 213, 214, 215, 216, 217.
- H. D. Ed. 220. Developmental Tasks (3).
- H. D. Ed. 230, 231. Field Program in Child Study I and II (2-6).
- H. D. 250a, 250b, 250c. Direct Study of Children (1, 1, 1).
- H. D. Ed. 260. Synthesis of Human Development Concepts (3).
- H. D. Ed. 270. Seminars in Special Topics in Human Development (2-6).

F. Industrial Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Ind. Ed. 105. General Shop (2). Second semester. Laboratory fee, \$5.00.
- Ind. Ed. 140. Curriculum, Instruction, and Observation (3). First semester. Hornbake.
- Ind. Ed. 141, 142. Industrial Safety Education I (2, 2).
- Ind. Ed. 143, 144. Industrial Safety Education II—Advanced (2, 2).
- Ind. Ed. 145, 146. Industrial Hygiene Education (2, 2).

- Ind. Ed. 150. Training Aids Development (2). Second semester.
- Ind. Ed. 157. Tests and Measurements (2).
- Ind. Ed. 161. Principles of Vocational Guidance (2).
- Ind. Ed. 164. Shop Organization and Management (2). Second semester.
- Ind. Ed. 165. Modern Industry (3). Summer Session.
- Ind. Ed. 166. Educational Foundations of Industrial Arts (2). First semester.
Brown, Horbake.
- Ind. Ed. 167. Problems in Occupational Education (2). Offered in Baltimore.
- Ind. Ed. 168. Trade or Occupational Analysis (2). First semester.
- Ind. Ed. 169. Course Construction (2).
- Ind. Ed. 170. Principles of Vocational Education (2). Summer session.
- Ind. Ed. 171. History of Vocational Education (2). Summer session.

FOR GRADUATES

- Ind. Ed. 207. Philosophy of Industrial Arts Education (2). First semester.
Horbake.
- Ind. Ed. 214. School Shop Planning and Equipment Selection (2). Second semester.
Horbake.
- Ind. Ed. 216. Supervision of Industrial Arts (2). Second semester.
Horbake.
- Ind. Ed. 220. Organization, Administration, and Supervision of Vocational Education (2).
- Ind. Ed. 240. Research in Industrial Arts and Vocational Education (2).
First and second semesters. Staff.
- Ind. Ed. 241. Content and Method of Industrial Arts (2). Second semester.
Horbake.
- Ind. Ed. 248. Seminar in Industrial Arts and Vocational Education (2).

G. Music Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Mus. Ed. 125. Creative Activities in the Elementary School Which Contribute to Musical Development (2). Prerequisite, consent of instructor.
- Mus. Ed. 127. Methods and Materials for Program Productions in the Secondary School (2). Prerequisite, consent of instructor.
- Mus. Ed. 128. Workshop in Music for Elementary Schools (2). Prerequisite, consent of instructor.

- Mus. Ed. 132. Workshop in Music for the Junior High School (2). Prerequisite, consent of instructor.
- Mus. Ed. 140. Workshop in Popular Music for Secondary Schools (2).
- Mus. Ed. 155. Organization and Technique of Instrumental Class Instruction (2). Prerequisite, consent of instructor.
- Mus. Ed. 170. Methods and Materials for Class Piano Instruction (2). Prerequisite, consent of instructor.
- Mus. Ed. 175. Methods and Materials in Vocal Music for the High School (2). Prerequisite, consent of instructor.
- Mus. Ed. 180. Instrumental Seminar (2). Prerequisite, consent of instructor.

H. Nursing Education

FOR ADVANCED UNDERGRADUATES AND GRADUATES

- N. Ed. 112. School of Nursing Finance and Administration (3). (Offered in Baltimore.)
- N. Ed. 115, 116. Ward Management and Clinical Teaching (2, 2). (Offered in Baltimore.)
- N. Ed. 117. Newer Trends in Nursing Service (2). (Offered in Baltimore.)
- N. Ed. 118. Industrial Nursing (2). (Offered in Baltimore.)
- N. Ed. 190. Principles of Pediatric Nursing (3). (Offered in Baltimore.)

FOR GRADUATES

- N. Ed. 286. Research Methods & Materials in Nursing Education (2). (Offered in Baltimore.)
- N. Ed. 287. Seminar in Problems in Nursing Education (2). (Offered in Baltimore.)

I. Science Education

- Sci. Ed. 105. Workshop in Science for Elementary Schools (2). Summer School Laboratory fee, \$2.00.

ELECTRICAL ENGINEERING

Professors Corcoran, Reed, Weber; Lecturers Ahrendt, Freeman, Schulman; Associate Professors Hodgins, Wagner, Small; Assistant Professors Price, Simons, Becker.

Electromagnetic Waves, E. E. 120, is required of all candidates for the Master of Science degree in electrical engineering unless the candidate has had a comparable undergraduate course. Electromagnetic Theory, E. E. 201, is required of all candidates unless permission for an appropriate substitution is granted.

A written qualifying examination is required of all candidates for the Master's degree in electrical engineering. This examination will be held Saturday, October 10, 1953. Off-campus and part-time students must have sat-

isfactorily completed a minimum of nine semester hours of graduate course work before being admitted to the written qualifying examination. Full-time students having less than nine semester hours of graduate course work are permitted to take this examination by special arrangement. The student must have been admitted to the graduate school before taking this examination.

Part-time students working toward the Master of Science degree in electrical engineering must take a minimum of six semester hours of course work from resident professors of electrical engineering. Part-time students working toward the Doctor of Philosophy degree must take a minimum of twenty-four semester hours of course work from resident professors of electrical engineering.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- E. E. 100. Alternating-Current Circuits (4).** Three lectures and one laboratory period a week, first semester. Laboratory fee, \$4.00. Prerequisites, Math. 21, Phys. 21, and E. E. 1. Price.
- E. E. 101. Engineering Electronics (4).** Three lectures and one laboratory period a week, second semester. Laboratory fee, \$4.00. Prerequisite, E. E. 100. Price.
- E. E. 102, 103. Alternating-Current Machinery (4, 4).** Three lectures and one laboratory period a week, first and second semesters. Laboratory fee \$4.00. Prerequisites, E. E. 65 and E. E. 100. Hodgins.
- E. E. 104. Communication Circuits (3).** Three lectures a week, second semester. Prerequisites, E. E. 60 and E. E. 100. Reed.
- E. E. 105, 106. Radio Engineering (4, 4).** Three lectures and one laboratory period a week, first and second semesters. Laboratory fee, \$4.00. Prerequisite, E. E. 101. Wagner.
- E. E. 108. Electric Transients (3).** Three lectures a week, second semester. Prerequisite, E. E. 101. Schulman, Reed.
- E. E. 109. Pulse Techniques (3).** Three lectures a week, second semester. Prerequisite, E. E. 105. Schulman.
- E. E. 114. Applied Electronics (3).** Three lectures a week, first semester. Prerequisite, E. E. 101. Schulman.
- E. E. 115. Industrial Electronics (4).** Three lectures and one laboratory period a week, second semester. Prerequisite, E. E. 101. Price.
- E. E. 116. Alternating-Current Machinery Design (3).** Two lectures and one calculation period a week, second semester. Prerequisite, concurrent registration in E. E. 103. Reed.
- E. E. 117. Power Transmission and Distribution (3).** Three lectures a week, first semester. Prerequisite, concurrent registration in E. E. 102. Reed

- E. E. 120. Electromagnetic Waves (3). Three lectures a week, first semester. Required of M. S. degree candidates in electrical engineering. Reed.
- E. E. 160, 161. Vacuum Tubes (3, 3). Three lectures a week, first and second semesters. Weber.

FOR GRADUATES

- E. E. 200. Symmetrical Components (3). Three lectures a week, first semester. Prerequisite, E. E. 103. Reed.
- E. E. 201. Electromagnetic Theory (3). Three lectures a week, second semester. Prerequisite, E. E. 120. Required of M. S. degree candidates in electrical engineering. Weber.
- E. E. 202, 203. Transients in Linear Systems (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Required of M. S. degree candidates in electrical engineering. Wagner.
- E. E. 204, 205. Advanced Circuit Analysis (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical engineering or physics. Reed.
- E. E. 206, 207. Microwave Engineering (3, 3). Three lectures a week, first semester; two lectures and one laboratory period a week, second semester. Laboratory fee, second semester, \$4.00. Prerequisite, E. E. 201. (Not offered 1953-1954.) Weber.
- E. E. 209. Stability in Power Systems (3). Three lectures a week, second semester. Prerequisite, E. E. 200. Reed.
- E. E. 210, 211. Advanced Radio Engineering (3, 3). Three lectures a week, first and second semesters. Prerequisite, E. E. 106. Davies.
- E. E. 212, 213. Automatic Regulation (3, 3). Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Ahrendt.
- E. E. 215, 216. Radio Wave Propagation (3, 3). Three lectures a week, first and second semesters. Prerequisite, E. E. 120. Katzin.
- E. E. 218, 219. Signal Analysis and Noise (3, 3). Three lectures a week, first and second semesters. Prerequisite, E. E. 202 or equivalent. (Not offered 1953-1954.) Freeman.
- E. E. 222. Graduate Seminar (1). First semester. Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Graduate Staff.
- E. E. 232. Active Network Analysis (3). Three lectures a week, first semester. Prerequisite, E. E. 202 or E. E. 204. Corcoran.

- E. E. 233. **Network Synthesis** (3). Three lectures a week, second semester. Prerequisite, E. E. 232. Coreoran.
- E. E. 235. **Applications of Tensor Analysis** (3). Three lectures a week, second semester. Prerequisite, E. E. 202. (Not offered 1953-1954.) Wagner
- E. E. 250. **Electrical Engineering Research.** Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Six semester hours are required of M.S. degree candidates and a minimum of 18 semester hours are required of Ph.D candidates. Graduate Staff

ENGLISH LANGUAGE AND LITERATURE

Professor Murphy, Aldridge, Bode, Harman; Lecturer McManaway; Associate Professors Ball, Cooley, Manning, Mooney, Ward, Weber, Zeeveld; Assistant Professors Andrews, Coulter, Fleming, Gravely, Schaumann; Instructors Adams, Anderson, Barnes, Beall, Bezanson, Bradley, Demaree, Dinwiddie, Ellis, Goldsmith, Henault, Lutwack, C. P. Martin, M. Martin, Miller, Mish, Orel, Pierson, Portz, Smith, Stone.

MASTER OF ARTS

1. Students must demonstrate a reading knowledge of a foreign language before they will be recommended for admission to candidacy. A choice of French or German is recommended, but in exceptional cases another language may be substituted by special permission of the Department.
2. Candidates must pass a final written examination covering the English language and the whole course of English and American literature.

DOCTOR OF PHILOSOPHY

1. Students must demonstrate a reading knowledge of German and French before they will be permitted to take the preliminary qualifying examination.
2. Students must pass a preliminary qualifying examination before they will be recommended for admission to candidacy. They are expected to take this examination by the time they have completed a full year of residence beyond the Master of Arts requirement.
3. Candidates must pass a comprehensive written examination covering linguistics and the whole course of English and American literature.

- Eng. 101. **History of the English Language** (3). Second semester. Harman.
- Eng. 102. **Old English** (3). First semester. Ball.
- Eng. 103. **Beowulf** (3). Second semester. Ball.
- Eng. 104. **Chaucer** (3). First semester. Harman.

- Eng. 106. English and Scottish Ballads (3). Not offered 1953-54. Cooley.
- Eng. 110, 111. Elizabethan and Jacobean Drama (3, 3). (Not offered 1953-1954.) Zeeveld.
- Eng. 112. The Poetry of the Renaissance (3). First semester. Zeeveld.
- Eng. 113. Prose of the Renaissance (3). Second semester. Zeeveld.
- Eng. 115, 116. Shakespeare (3, 3). First and second semesters. Zeeveld.
- Eng. 120. English Drama from 1660 to 1800 (3). Second semester. Ward.
- Eng. 121. Milton (3). Second semester. Murphy.
- Eng. 122. Literature of the Seventeenth Century, 1600-1660 (3). (Not offered 1953-1954.) Murphy.
- Eng. 123. Literature of the Seventeenth Century, 1660-1700 (3). (Not offered 1953-1954.) Aldridge.
- Eng. 125, 126. Literature of the Eighteenth Century (3, 3). First and second semesters. Aldridge.
- Eng. 129, 130. Literature of the Romantic Period (3, 3). First and second semesters. Weber.
- Eng. 134, 135. Literature of the Victorian Period (3, 3). (Not offered 1953-1954.) Cooley, Mooney.
- Eng. 139, 140. The English Novel (3, 3). First and second semesters. Ward, Mooney.
- Eng. 143. Modern Poetry (3). First semester. Murphy.
- Eng. 144. Modern Drama (3). First semester. Weber.
- Eng. 145. The Modern Novel (3). Second semester. Andrews.
- Eng. 148. The Literature of American Democracy (3). (Not offered 1953-1954.) Manning.
- Eng. 150, 151. American Literature to 1900 (3, 3). First and second semesters. Gravely, Manning.
- Eng. 155, 156. Four Major American Writers (3, 3). First and second semesters. Manning, Gravely.
- Eng. 157. Introduction to Folklore (3). First semester. Cooley.
- Eng. 170. Creative Writing (2). First semester. Prerequisite, permission of the instructor. Fleming.
- Eng. 171. Advanced Creative Writing (2). Second semester. Prerequisite, permission of the instructor. Fleming.
- Eng. 172. Playwriting (2). Second semester. Prerequisite, permission of the instructor. Fleming.

FOR GRADUATES

Eng. 200. Research (3-6). Arranged.	Staff.
Eng. 201. Bibliography and Methods (3). First semester.	Mooney.
Eng. 202. Middle English (3). First semester.	Harman.
Eng. 203. Gothic (3). Second semester.	Harman.
Eng. 204. Medieval Romances (3). (Not offered 1953-1954.)	Cooley.
Eng. 206, 207. Seminar in Renaissance Literature (3, 3). First and second semesters.	McManaway.
Eng. 210. Seminar in Seventeenth Century Literature (3). (Not offered 1953-1954.)	Zeeveld, Murphy.
Eng. 212, 213. Seminar in Eighteenth Century Literature (3, 3). First and second semesters.	Aldridge.
Eng. 214, 215. Seminar in Nineteenth Century Literature (3, 3). Second semester.	Cooley, Mooney, Weber.
Eng. 216, 217. Literary Criticism (3, 3). (Not offered 1953-1954.)	Murphy.
Eng. 225, 226. Seminar in American Literature (3,3). First and second semesters.	Bode.
Eng. 227, 228. Problems in American Literature (3, 3). (Not offered 1953-1954.)	Aldridge.
Eng. 230. Studies in American Language (3). (Not offered 1953-1954.)	

ENTOMOLOGY

Professors Cory, Langford; Lecturers Munson, Sailer, Shepard; Associate Professors Bickley, Bissell, Ditman, McConnell; Assistant Professors Abrams, Haviland.

The Department of Entomology offers work toward the degrees of Master of Science and Doctor of Philosophy.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Ent. 100. Advanced Apiculture (3). One lecture and two three-hour laboratory periods a week, second semester. Prerequisite, Ent. 4. Laboratory fee, \$3.00.	Abrams.
Ent. 101. Economic Entomology (3). (Not offered in 1953-1954.)	
Ent. 103, 104. Insect Pests (3, 3). Two lectures and one three-honr laboratory period a week, first and second semesters. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, \$3.00.	Cory.

- Ent. 105. **Medical Entomology (3).** Two lectures and one two-hour laboratory period a week, first semester. Prerequisite, Ent. 1 or consent of the Department. Laboratory fee, \$3.00. Bickley.
- Ent. 106. **Advanced Insect Taxonomy (3).** Two three-hour laboratory periods a week, first semester. Prerequisite, Ent. 3. Laboratory fee, \$3.00. Bickley.
- Ent. 107. **Insecticides (2).** Second semester. Prerequisites, Ent. 1 and elementary organic chemistry. Shepard.
- Ent. 109. **Insect Physiology (2).** Two lectures and occasional demonstrations, second semester. Prerequisite, consent of the Department. Munson.
- Ent. 110, 111. **Special Problems (1, 1).** First and second semesters. Prerequisites, to be determined by the Department. Cory and Staff.
- Ent. 112. **Seminar (1).** First and second semesters. Cory and Staff.
- Ent. 113. **Entomological Literature (1).** Second semester. Bickley.
- Ent. 114. **Insect Pests of Greenhouses (3).** Two lectures and one three-hour laboratory period a week, second semester. Prerequisite, Ent. 1 or consent of the Department. Laboratory fee, \$3.00. Haviland.

FOR GRADUATES

- Ent. 201. **Advanced Entomology.** Credit and prerequisites to be determined by the Department. First and second semesters. Cory and Staff.
- Ent. 202. **Research.** Cory and staff.
- Ent. 203. **Advanced Insect Morphology (2).** One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Bickley.
- Ent. 205. **Insect Ecology (2).** One lecture and one two-hour laboratory period a week, first semester. Laboratory fee, \$3.00. Prerequisite, consent of the Department. Sailer.
- Ent. 206. **Bionomics of Mosquitoes (2).** One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, \$3.00. Bickley.

FOREIGN LANGUAGES AND LITERATURE

Professors Zucker, Falls, Prahl, Cunz, L. P. Smith, Goodwyn, Miller (abroad as Director of C.S.C.S. European program); Associate Professors Kramer, Quynn, Bingham; Assistant Professors Parsons, Schweizer, Rand, Rosenfield, Hammerschlag, Dobert; Instructors Nemes, de Marne, Norton, Boborykine, Becker, Rovner.

Master of Arts

Candidates must pass, in addition to written examinations in the courses

pursued, a written examination based on the reading lists in their respective fields of French, German and Spanish, established by the Department. The examination will test the generall familiarity of the candidate with his respective field and his powers of analysis and criticism. The oral examination will deal chiefly with the field of his thesis.

Doctor of Philosophy

Candidates must pass a comprehensive written examination at least three months before the degree is awarded. This examination will include linguistics and each of the major literary fields.

Attention is called to the courses in **Comparative Literature** listed on page 51.

A. French

FOR GRADUATES AND ADVANCED UNDERGRADUATES

French 0. Intensive Elementary French (0). Intensive elementary course in the French language designed particularly for graduate students who wish to acquire a reading knowledge. (Staff.)

French 100. French Literature of the Sixteenth Century (3). First semester. Falls

French 101, 102. French Literature of the Seventeenth Century (3,). Three hours a week, first and second semesters. Quynn, Rosenfield.

French 103, 104. French Literature of the Eighteenth Century (3, 3). Three hours a week, first and second semesters. Falls, Bingham.

French 105, 106. French Literature of the Nineteenth Century (3, 3). Three hours a week, first and second semesters. Bingham, Quynn.

French 107, 108. French Literature of the Twentieth Century (3, 3). Three hours a week, first and second semesters. Falls.

French 121, 122. Advanced Composition (3, 3). Three hours a week, first and second semesters. Falls.

French 161, 162. French Civilization (3, 3). First and second semesters. Rosenfield.

French 171. Practical French Phonetics (3). First semester. Smith.

French 199. Rapid Review of the History of French Literature (1). Second semester. Especially designed for French majors. Weekly lectures. Falls

FOR GRADUATES

The requirements of students will determine which courses will be offered.

French 201. Research. Credit determined by work accomplished. Staff.

French 203, 204. George Duhamel, Poet, Dramatist, Novelist (2,).	Two hours a week, first and second semesters.	Falls.
French 205, 206. French Literature of the Middle Ages (3, 3).	Three hours a week, first and second semesters.	Smith.
French 207, 208. The French Novel in the First Half of the Nineteenth Century (2, 2).	Two hours a week, first and second semesters.	Falls.
French 209, 210. The French Novel in the Second Half of the Nineteenth Century (2, 2).	Two hours a week, first and second semesters.	Falls.
French 211. Introduction to Old French (3).	Second semester.	Smith.
French 215, 216. Moliere (3, 3).	First and second semesters.	Quynn.
French 221, 222. Reading Course. (Arranged.)		Staff.
French 230. Introduction to European Linguistics (3).		Smith
French 251, 252. Seminar (3, 3).	Required of all graduate majors in French.	Staff.

B. German

FOR GRADUATES AND ADVANCED UNDERGRADUATES

German 0. Intensive Elementary German (0.)	Intensive elementary course in the German language designed particularly for graduate students who wish to acquire a reading knowledge.	Staff.
German 101, 102. German Literature of the Eighteenth Century (3, 3).	Three hours a week, first and second semesters.	Prahl, Schweizer.
German 103, 104. German Literature of the Nineteenth Century (3, 3).	Three hours a week, first and second semesters.	Prahl, Cunz.
German 105, 106. Modern German Literature (3, 3).	Three hours a week, first and second semesters.	Prahl, Hammerschlag.
German 107, 108. Goethe's Faust (2, 2).	Two hours a week, first and second semesters.	Zucker.
	Attention is called to Comp. Lit. 106, <i>Romanticism in Germany</i> , and Comp. Lit. 107, <i>The Faust Legend in English and German Literature</i> .	
German 121, 122. Advanced Composition (3, 3).	Three hours a week, first and second semesters. Prerequisites, German 71, 80, or consent of instructor.	Kramer, Cunz.
German 161, 162. German Civilization (3, 3).	Three hours a week, first and second semesters.	Cunz.
German 199. Rapid Review of the History of German Literature (1).	Second semester. Especially designed for German majors. Weekly lectures.	Schweizer.

FOR GRADUATES

The requirements of students will determine which courses will be offered.	
German 201. Research. Credits determined by work accomplished.	Staff.
German 202, 203. The Modern German Drama (3, 3). Three hours a week, first and second semesters.	Zucker.
German 204. Schiller (3).	Prahl.
German 205. Goethe's Works outside of Faust (2). Second semester.	Zucker.
German 206. The Romantic Movement (3).	Prahl.
German 208. The Philosophy of Goethe's Faust (3). First semester.	Zucker.
German 221, 222. Reading Course. (Arranged). First and second semesters.	Staff.
German 230. Introduction to European Linguistics (3). First semester.	Smith
German 231. Middle High German (3). Second semester.	Schweizer.
German 251, 252. Seminar (3, 3). Required of all graduate majors in German.	Staff.

C. Spanish

Spanish 101. Epic and Ballad (3). First semester.	Goodwyn, Parsons.
Spanish 104. The Drama of the Golden Age (3). Second semester.	Goodwyn.
Spanish 108. Lope de Vega (3). First semester.	Parsons.
Spanish 109. Cervantes (3). Second semester.	Goodwyn, Rand.
Spanish 110. Modern Spanish Poetry (3). First semester.	Rand.
Spanish 111. Modern Spanish Novel (3). Second semester.	Parsons.
Spanish 112. Modern Spanish Drama (3). First semester.	Rand.
Spanish 115. Modern Spanish Thought (3). Second semester.	Rand.
Spanish 121, 122. Advanced Composition (3, 3). First and second semesters.	Bingham.
Spanish 151. Spanish-American Novel (3). First semester.	Goodwyn.
Spanish 152. Spanish-American Poetry (3). Second semester.	Goodwyn.
Spanish 153. Spanish-American Essay (3). First semester.	Goodwyn.
Spanish 161, 162. Spanish Civilization (3, 3). First and second semesters.	Goodwyn, Jimenz.
Spanish 163, 164. Latin-American Civilization (3, 3). First and second semesters.	Goodwyn.

Spanish 199. Rapid Review of the History of Spanish Literature (1). Second semester. Especially designed for Spanish majors. Weekly lectures.

FOR GRADUATES

Spanish 201. Research. Credit determined by work accomplished.	Staff.
Spanish 202. The Golden Age in Spanish Literature (3).	First semester. Goodwyn.
Spanish 203, 204. Spanish Poetry (3, 3).	Three hours a week, first and second semesters. Goodwyn.
Spanish 207. The Spanish Mystics (3).	Goodwyn.
Spanish 211. Introduction to Old Spanish (3).	Second semester. Parsons.
Spanish 221, 222. Reading Course. (Arranged).	Staff.
Spanish 230. Introduction to European Linguistics (3).	Smith.
Spanish 251, 252. Seminar (3, 3). Required of all graduate majors in Spanish.	Staff.

D. Russian

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Russian 101, 102. Contemporary Russian Literature (3, 3).	Three hours a week, first and second semesters.
Russian 103, 104. Russian Literature of the Nineteenth Century (3, 3).	Three hours a week, first and second semesters. Boborykine.

GEOGRAPHY

Professors Van Royen, Hu, _____; Consulting Professor Roterus
 Lecturers with rank of Professor Lemons, McBryde; Assistant Professors Augelli, Karinen, Patton; Instructors Calhoun, Herbst, Pickard; Research Associate Battersby; Research Assistants Allen Kelley; Lecturers (off-campus courses) Aiken, Brierly, Calhoun, Davies, Dooley, Higgins, Mercready, Skop, Totten.

Students seeking graduate degrees in geography are expected to have acquired a broad foundation in the subject and in allied fields. This foundation must have included a minimum of 24 semester hours in geography, of which 6 semester hours shall have been in Morphology and Map Reading and Interpretation, 6 semester hours in Weather and Climate, and 12 semester hours in Human, Economic, or Regional Geography. In addition the student must have taken successfully the following courses, or their equivalents, in allied fields; American Government (3 semester hours), Anthropology (3 semester hours),

Economics (6 semester hours), History (6 semester hours), Introductory or General Botany (3 semester hours), Sociology (3 semester hours), English Composition and Literature (12 semester hours), Foreign Language (12 semester hours). Students who do not have this background will be accepted as graduate students on a provisional status only and will be required to make up their deficiencies before being admitted to candidacy for an advanced degree. Graduate credit will not be given for courses taken to make up for deficiencies in background.

In addition to meeting the general requirements of the Graduate School, candidates for the Master's degree in geography are required to have taken successfully: one field course (Georgarphy 200, or equivalent), a course in General Cartography and Graphics (Geography 154 and 155, or equivalent), at least one course in Soils, and one seminar. In addition to the final oral examination, the candidate for the Master's degree in geography is required to pass satisfactorily a written examination covering the fields in which he has worked, his understanding of basic principles, and his power of reasoning.

A graduate student seeking the Doctor of Philosophy degree in geography must take a comprehensive written and oral examination to determine whether he has sufficiently broad and profound knowledge and understanding of the entire field of geography to qualify as a candidate for the Doctor's' degree. He will be examined in the systematic aspects of the field (Geomorphology, Climatology, Plant Georgarphy, Soils and Soil Geography, Cartography, Social and Economic Geography, and History, Methodology and Philosophy of Geography), and in two or three regional fields. Normally, before taking the examination, the student should have taken one or more courses under each of the senior members of the staff, and seminars under at least two of them.

Geog. 100, 101. Regional Geography of the United States and Canada (3, 3).

First and second semesters. Prerequisites, Geog. 1, 2 or Geog. 10, 11 or permission of instructor. Herbst.

Geog. 105. Geography of Maryland and Adjacent Areas (3.) First and second semesters. Prerequisite, permission of the instructor.

An analysis of the physical environment, natural resources, and population in relation to agriculture, industry, transport, and trade in the state of Maryland and adjacent areas. Patton.

Geog. 110, 111. Latin America (3, 3). First and second semesters. Augelli.

Geog. 120. Economic Geography of Europe (3). First semester.

Van Royen, Patton.

Geog. 122. Economic Resources and Development of Africa (3). Second semester.

Van Royen.

Geog. 123. Problems of Colonial Geography (3). First or second semester.

Geog. 130, 131. Economic and Political Geography of Southern and Eastern Asia (3, 3). First and second semesters.

Hu.

Geog. 134, 135. Cultural Geography of East Asia (3, 3). First and second semester. Hu.

Geog. 140. Soviet Lands (3). First or second semester.

Geog. 146. The Near East (3). First semester.

Geog. 150. Problems of Map Evaluation I. Topographic Maps (3). Off campus. First or second semester. Two hours lecture and two hours laboratory a week. Prerequisite, Geog. 30. Davies, Geological Survey.

Geog. 151. Problems of Map Evaluation II. Non-Topographic Special-Use Maps (3). Off campus. First or second semester. Two-hour lecture and two hours laboratory a week. Prerequisite, Geog. 150.

Brierly, Army Map Service.

Geog. 152. Problems and Practices of Photo Interpretation (3). First and second semesters. Two-hour lecture and two hours laboratory a week. Prerequisite, Geog. 30, 35 or equivalent.

Geog. 154, 155. General Cartography and Graphics (3, 3). First and second semesters. One lecture and two two-hour laboratory periods a week. Prerequisite, Geog. 30 or consent of instructor. Karinen.

Geog. 158. Elementary Toponymy (3). Off campus. First and second semesters. Prerequisite, Geog. 30 and one foreign language.

Aiken, Army Map Service.

Geog. 160. Advanced Economic Geography I. Agricultural Resources (3). First semester. Prerequisite, Geog. 1 and 2, or Geog. 10 and 11.

The nature of agricultural resources, the major types of agricultural exploitation in the world, and the geographic distribution of certain major crops and animals in relation to the physical environment and economic geographic conditions. Main problems of conservation. Van Royen.

Geog. 161. Advanced Economic Geography II. Mineral Resources (3). Second semester. Prerequisite, Geog. 1 and 2, or Geog. 10 and 11.

The nature and geographic distribution of the principal power, metallic and other minerals. Economic geographic aspects of modes of exploitation. Consequences of geographic distribution and problems of conservation Van Royen.

Geog. 170. Local Field Course (3). First semester.

Karinen.

Geog. 180, 181. History, Nature and Methodology of Geography (3, 3). First and second semesters. Hu.

Geog. 190. Political Geography (3). Second semester.

Geographical factors in national power and international relations; an analysis of the role of "Geopolitics" and "Geostrategy," with special reference to the current world scene. Augelli.

Geog. 195. Geography of Transportation (3). Second semester.

The distribution of transport routes of the earth's surface; patterns of transport routes; the adjustment of transport routes and media to conditions of the natural environment; transportation centers and their distribution. Patton.

Geog. 197. Urban Geography (3). First semester.

Origins of cities, followed by a study of the elements of site and location with reference to cities. The patterns and functions of some major world cities will be analyzed. Theories of land use differentiation within cities will be appraised. Patton.

Geog. 199. Topical Investigations (1-3). First and second semesters.

Independent study under individual guidance. Choice of subject matter requires joint approval of adviser and head of the Department of Geography. Restricted to advanced undergraduate students with credit for at least 24 hours of geography. Staff.

FOR GRADUATES

Geog. 200. Field Course (3). Field work in September, conferences and reports during first semester. For graduate students in geography. Open to other students by special permission of the Head of the Department of Geography.**Geog. 210, 211. Seminar in the Geography of Latin America (3, 3).** First and second semesters. Prerequisites, Geog. 110, 111 or consent of instructor. McBryde.**Geog. 220, 221. Seminar in the Geography of Europe and Africa (3, 3).** First and second semesters. Prerequisites, Geog. 120, 121 or consent of instructor, Van Royen.**Geog. 230, 231. Seminar in the Geography of East Asia (3, 3).** First and second semesters.

Analysis of problems concerning the geography of East Asia with emphasis on special research methods and techniques applicable to the problems of this area.

Geog. 240, 241. Seminar in the Geography of the U.S.S.R. (3, 3). First and second semesters. Prerequisites, reading knowledge of Russian and Geog. 140 or consent of instructor.**Geog. 246. Seminar in the Geography of the Near East (3).****Geog. 250. Seminar in Cartography.** (Credit to be arranged.) First or second semester. Karinen, Davies.**Geog. 260. Advanced General Climatology (3).** First semester. Prerequisite, Geog. 42, or consent of instructor. Lemons.**Geog. 261. Applied Climatology (3).** Second semester. Prerequisite, Geog. 42, or consent of instructor. Lemons.

- Geog.** 262, 263. Seminar in Meteorology and Climatology. (3, 3). First and second semesters. Prerequisite, consent of instructor. Lemons.
- Geog.** 280. Geomorphology (3). Second semester. Van Royen.
- Geog.** 290, 291. Selected Topics in Geography (1-3). First and second semesters. Prerequisite, joint consent of adviser and Head of the Department of Geography. Staff.
- Geog.** 292, 293. Dissertation Research. (Credit to be arranged.) First and second semesters and summer.

GOVERNMENT AND POLITICS

Professors Burdette, Plischke, Starr, and Steinmeyer; Assistant Professors Anderson, Dixon, Hall, Moser, and Smith; Instructors Carraher, Goostree, Jans, Parr, Secher, and Stillings.

For the Master's degree, a comprehensive written examination is given on graduate course work in the major field. At the discretion of the Department, an oral examination may be substituted for the written examination.

The doctoral candidate must show in written examinations satisfactory competence in five of the following fields: (1) Comparative Government; (2) International Political Affairs; (3) Local Government; (4) Political Theory; (5) Public Administration; (6) Public Law; (7) Public Policy. No candidate may attempt the comprehensive examinations prior to completion of the language requirements for the doctorate, and no candidate may attempt the comprehensive examinations more than twice.

Government and Politics

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- G. & P. 101.** International Political Relations (3). First semester. Prerequisite, G. & P. 1. Starr, Plischke.
- G. & P. 102.** International Law (3). Second semester. Prerequisite, G. & P. 1. Starr, Plischke.
- G. & P. 105.** Recent Far Eastern Politics (3). First semester. Prerequisite, G. & P. 1. Steinmeyer.
- G. & P. 106.** American Foreign Relations (3). Second semester. Prerequisite, G. & P. 1. Plischke.
- G. & P. 110.** Principles of Public Administration (3). First semester. Pre-requisite, G. & P. 1. Dixon, Stillings.
- G. & P. 111.** Public Personnel Administration (3). First semester. Prerequisite, G. & P. 1. Stillings.

- G. & P. 112. Public Financial Administration (3). Second semester. Prerequisite, G. & P. 1. Stillings.
- G. & P. 124. Legislatures and Legislation (3). Second semester. Prerequisite, G. & P. 1. Burdette, Starr.
- G. & P. 131, 132. Constitutional Law (3, 3). First and second semesters. Prerequisite, G. & P. 1. Dixon.
- G. & P. 133. Administration of Justice (3). Second semester. Prerequisite, G. & P. 1. Dixon.
- G. & P. 141. History of Political Theory (3). First semester. Prerequisite, G. & P. 1. Anderson, Dixon.
- G. & P. 142. Recent Political Theory (3). Second semester. Prerequisite, G. & P. 1. Anderson, Dixon.
- G. & P. 144. American Political Theory (3). Second semester. Prerequisite, G. & P. 1. Anderson.
- G. & P. 154. Problems of World Politics (3). Second semester. Prerequisite, G. & P. 1. Steinmeyer.
- G. & P. 174. Political Parties (3). First semester. Prerequisite, G. & P. 1. Burdette.
- G. & P. 178. Public Opinion (3). First semester. Prerequisite, G. & P. 1. Burdette.
- G. & P. 181. Administrative Law (3). Second semester. Prerequisite G. & P. 1. Dixon.
- G. & P. 197. Comparative Governmental Institutions (3). Second semester. Prerequisite, G. & P. 1. Starr.

FOR GRADUATES

- G. & P. 201. Seminar in International Political Organization (3). Starr, Plischke.
- G. & P. 202. Seminar in International Law (3). Starr, Plischke.
- G. & P. 205. Seminar in American Political Institutions (3). Burdette.
- G. & P. 207. Seminar in Comparative Governmental Institutions (3). Starr, Steinmeyer.
- G. & P. 211. Seminar in Federal-State Relations (3). Staff.
- G. & P. 213. Problems of Public Administration (3). Staff.
- G. & P. 214. Problems of Public Personnel Administration (3). Staff.
- G. & P. 215. Problems of State and Local Government in Maryland (3). Staff.
- G. & P. 216. Government Administrative Planning and Management (3). Staff.

G. & P. 217. Government Corporation and Special Purpose Authorities.	Staff.
G. & P. 221. Seminar in Public Opinion (3).	Burdette.
G. & P. 223. Seminar in Legislatures and Legislation (3).	Burdette.
G. & P. 224. Seminar in Political Parties and Politics (3).	Burdette.
G. & P. 225. Man and the State (3).	Anderson
G. & P. 231. Seminar in Public Law (3).	Dixon.
G. & P. 251. Bibliography of Government and Politics (3).	Burdette.
G. & P. 261. Research in Government and Politics (3).	Staff.
G. & P. 281. Departmental Seminar (No Credit). Registration for two semesters required of all doctoral candidates.	Staff.
G. & P. 299. Thesis Course (Arranged).	

HISTORY

Professors Gewehr, Chatelain, Prange, Welborn; Associate Professors Bauer, Merrill; Assistant Professors Crosman, Gordon, Jasieński, Sparks; Instructors Bates, Ferguson, Hanks, Lowitt, Harbaugh.

Master of Arts

1. Eight to ten hours of the total major course requirements of all candidates for this degree must be acquired in general field of the thesis, i.e., either American or European history.
2. H. 287, Historiography, is required of all candidates for graduate degrees in history.
3. Candidates for the Master of Arts degree must pass a two-hour qualifying written examination no later than one month before the date set for the final oral examination. The purpose of the written examination is to determine the student's general grasp of the larger field in which the thesis lies, (e. g. American, European, English, Latin-American). The examination will include not only factual and interpretative material, but also bibliography and historiography. However, it will not be based on courses as such.
4. The final oral examination will be confined to the general field of the thesis, and the thesis itself. It is understood that the representative of the minor field may examine the candidate on the minor subject or subjects at his discretion.

Doctor of Philosophy

1. At least thirty hours of the total major course requirements, including H. 287, must be acquired in the general field of the thesis, i.e., American history or European history.

2. At least ten hours of the thirty required for a minor in history must be taken at the University of Maryland.
3. Recommendations for admission to candidacy will be determined by the department on the basis of achievement which the student may be required to substantiate by oral or written examinations.
4. Before confirmation for the degree the student must pass a written comprehensive examination in addition to the final oral examination required by the Graduate School.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

A. American History

H. 5, 6 are prerequisites for courses H. 101 to H. 142, inclusive.

H. 101. American Colonial History (3). First semester.	Ferguson.
H. 102. The American Revolution (3). Second semester.	Ferguson.
H. 105. Social and Economic History of the United States to 1865 (3). First semester.	Chatelain.
H. 106. Social and Economic History of the United States Since the Civil War (3). Second semester.	Chatelain.
H. 114. The Middle Period of American History 1824-1860. (3). First semester.	Sparks.
H. 115. The Old South (3). First semester.	Bates.
H. 116. The Civil War (3). Second semester.	Sparks.
H. 117. The New South (3). First semester.	Bates.
H. 121, 122. History of the American Frontier (3, 3). First and second semesters.	Gewehr.
H. 123. The New West (3). Second semester.	Bates.
H. 124. Reconstruction and the New Nation 1865-1896 (3). Second semester.	Merrill.
H. 127, 128. Diplomatic History of the United States (3, 3). First and second semesters.	Wellborn.
H. 129. The United States and World Affairs (3). First semester.	Wellborn.
H. 133, 134. The History of American Ideas (3, 3). First and second semesters.	Ferguson.
H. 135, 136. Constitutional History of the United States (3, 3). First and second semesters.	Gewehr.
H. 141, 142. History of Maryland (3, 3). Three hours a week, first and second semesters.	Chatelain.

H. 145, 146. Latin-American History (3, 3). Three hours a week, first and second semesters. Crosman.

H. 147. History of Mexico (3). First semester. Crosman.

B. European History

H. 1, 2 or H. 3, 4 are prerequisites for courses H. 151 to H. 191, inclusive.

H. 151. History of the Ancient Orient and Greece (3). First semester. Jashemski.

H. 153. History of Rome (3). Second semester. Jashemski.

H. 155. Medieval Civilization (3). First semester. Jashemski.

H. 161. The Renaissance and Reformation (3). Second semester. Jashemski.

H. 166. Revolutionary and Napoleonic Europe (3). Second semester Bauer.

H. 171, 172. Europe in the Nineteenth Century, 1815-1919 (3, 3). First and second semesters. Bauer.

H. 175, 176. Europe in the World Setting of the Twentieth Century (3, 3). First and second semesters. Prange.

H. 185, 186. History of the British Empire (3, 3). First and second semesters. Gordon.

H. 187. History of Canada (3). First semester. Gordon.

H. 189. Constitutional History of Great Britain (3). Second semester. Gordon.

H. 191. History of Russia (3). First semester. Bauer.

H. 192. Foreign Policy of the USSR (3). Second semester. Prerequisites: H. 1, 2 and H. 191. Bauer.

H. 195. The Far East (3). Second semester. Gewehr.

H. 199. Proseminar in Historical Writing (3). First and second semesters. Lowitt.

FOR GRADUATES

H. 200. Research (3-6). Credit apportioned to amount of research. First and second semesters. Staff.

H. 201. Seminar in American History (3). First and second semesters. Staff.

H. 205, 206. Topics in American Economic and Social History (3, 3). First and second semesters. Chatelain.

H. 208. Topics in Recent American History (3). First and second semesters. Merill.

H. 211. The Colonial Period in American History (3). First semester. Ferguson.

H. 212. Period of the American Revolution (3).	Second semester.	Ferguson.
H. 215. The Old South (3).	First semester.	Gewehr.
H. 216. The American Civil War (3).	First semester.	Merrill.
H. 217. Reconstruction and its Aftermath (3).	Second semester.	Merrill.
H. 221, 222. History of the West (3, 3).		Gewebr.
H. 245. Topics in Latin-American History (3).		Crosman.
H. 250. Seminar in European History (3).	First and second semesters.	Bauer.
H. 251. Topics in Greek Civilization (3).		Jashemski.
H. 253. Topics in Roman History (3).		Jashemski.
H. 255. Medieval Culture and Society (3). (Arranged).		Jashemski.
H. 282. Problems in the History of World War II (3).		Prauge.
H. 285, 286. Topics in the History of Modern England and Great Britain (3,3).	First and second semesters.	Gordon.
H. 287. Historiography (3).	First and second semesters.	Required of all candidates for advanced degrees in history. Sparks.

HOME ECONOMICS

A. Textiles and Clothing

Professor Mitchell; Associate Professor Akin; Assistant Professor Wilbur.
Instructors Heagney, Parker.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Tex. 101. Problems in Textiles (3).	One lecture and three laboratory periods a week, first semester.	Laboratory fee, \$3.00.	Prerequisite, Tex. 100; Organic Chemistry. (Offered 1954-1955.)	Akin.
Tex. 102. Textile Testing (3).	Three laboratory periods a week, second semester.	Laboratory fee, \$3.00.	Prerequisite, Tex. 100.	Akin.
Tex. 105. Consumer Problems in Textiles (3).	Two lectures and one laboratory period a week, second semester.	Laboratory fee, \$3.00.	Prerequisite, Tex. 1, or equivalent.	Staff.
Tex. 106. Household Textiles (3).	Three laboratory periods a week, first semester.	Laboratory fee, \$3.00.	Prerequisite, Tex. 1, or equivalent.	Staff.
Tex. 108. Decorative Fabrics (2).	One lecture and one laboratory period a week, second semester.	Laboratory fee, \$3.00.	Prerequisite, Tex. 1.	Wilbur.

- Clo. 120.** Draping (3). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Wilbur.
- Clo. 121.** Pattern Design (2). Two laboratory periods a week, first and second semesters, summer session, 1954. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Wilbur.
- Clo. 122.** Tailoring (2). Two laboratory periods a week, first and second semesters, summer session, 1955. Laboratory fee, \$3.00. Prerequisite, Clo. 22. Mitchell.
- Clo. 123.** Children's Clothing (2). One lecture and one laboratory period a week, first semester. Laboratory fee, \$3.00. Prerequisite, Clo. 20A. or 20B, or equivalent.
- Clo. 124.** Projects and Readings in Textiles and Clothing (2). First semester. Laboratory fee, \$3.00. Mitchell.
- Clo. 126.** Fundamentals of Fashion (2-3). Second semester. Laboratory fee, \$3.00. Wilbur.
- Clo. 127.** Apparel Design (3). First and second semesters. Laboratory fee, \$3.00. Prerequisite, Clo. 120. Wilbur.
- Clo. 128.** Home Furnishings (3). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Tex. 1, Clo. 20A or B, or consent of instructor. Wilbur.

FOR GRADUATES

- Tex. 200.** Special Studies in Textiles (2-4). Laboratory fee, \$3.00.
- Clo. 220.** Special Studies in Clothing (2-4). First and second semesters, summer session 1953. Laboratory fee, \$3.00. Mitchell, Wilbur.
- Tex. and Clo. 230.** Seminar (1). First and second semesters. Laboratory fee, \$3.00. Mitchell.
- Tex. and Clo. 231.** Research (4-6). First and second semesters. Laboratory fee, \$3.00. Staff.
- Tex. and Clo. 232.** Economics of Textiles and Clothing (3). Second semester, summer session 1954. Laboratory fee, \$3.00. Mitchell.

B. Practical Art and Crafts

Professor Curtiss; Assistant Professors Cuneo, B. Mahoney; Instructors Brown, Cooper, Davis, List, A. Mahoney.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Pr. Art 100, 101.** Mural Design (2, 2). Two laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 2, 3, 21, and consent of the instructor. Cuneo.

Pr. Art 120, 121. Costume Illustration (2, 2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 21, 22, and consent of instructor.

Pr. Art 124, 125. Individual Problems in Costume (2, 2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 120, 121, and consent of instructor.

Pr. Art 132. Advertising Layout (2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 21, 22, 30, and consent of instructor. Cuneo.

Pr. Art 134, 135. Individual Problems in Advertising (2, 3). Two laboratory periods a week, second semester. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, or equivalent, and consent of instructor. Cuneo.

Pr. Art 136. Display (2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, to precede or parallel.

Pr. Art 138. Advanced Photography (2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 38, 39. Davis.

Pr. Art 142, 143. Advanced Interior Design (2, 2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 140, 141, or equivalent. Brown.

Pr. Art 144, 145. Individual Problems in Interior Design (2, 2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Pr. Art 1, 140, 141, 142, 143, and consent of instructor. Brown.

Cr. 120, 121. Advanced Ceramics (2, 2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 20, 21. Mahoney.

Cr. 124, 125. Individual Problems in Ceramics (2, 2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 20, 21, 120, 121, and consent of instructor. Mahoney.

Cr. 130, 131. Advanced Metalry (2, 2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 30, 31. Mahoney.

Cr. 134, 135. Individual Problems in Metalry (2, 2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 30, 31, 130, 131, and consent of instructor. Mahoney.

Cr. 140, 141. Advanced Weaving (2, 2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 40, 41. Cooper.

Cr. 144, 145. Individual Problems in Weaving (2, 2). Three laboratory periods a week, first and second semesters. Laboratory fee, \$3.00. Prerequisites, Cr. 40, 41, 140, 141, and consent of instructor.

Cooper.

C. Home and Institution Management

Professor Mount; Associate Professor Braucher; Assistant Professor Crow; Instructor Collins, Mearig.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Home Mgt. 150, 151. Management of Home (3, 3). Three hours a week, first and second semesters.

Crow, Mearig.

Home Mgt. 152. Experience in Management of Home (3). First and second semesters. Prerequisites, Home Mgt. 150, 151. Laboratory fee, \$7.00.

Crow, Mearig.

Inst. Mgt. 160. Institution Organization and Management (3). Two lectures and one laboratory period a week, second semester. Prerequisites, Foods 2, 3; Nut. 110; Home Mgt. 150, 151 to precede or parallel.

Collins.

Inst. Mgt. 161. Institution Purchasing and Accounting (3). Two lectures and one laboratory period a week, first semester.

Collins.

Inst. Mgt. 162. Institution Foods (3). One lecture and two laboratory periods a week, second semester. Prerequisites, Inst. Mgt. 160, 161.

Inst. Mgt. 164. Advanced Institution Management (2). One lecture and one laboratory period a week, second semester. Prerequisites, Inst. Mgt. 160, 161, 162.

Braucher.

Inst. Mgt. 165. School Lunch (3). Two lectures and one laboratory period a week, second semester and summer session. Prerequisites, Foods 2, 3; Nut. 110, or equivalent.

Inst. Mgt. 181. Purchasing and Accounting for Housekeeping Administration (3). Second semester. Prerequisite, Inst. Mgt. 160.

Inst. Mgt. 182. Housekeeping Management (3). First semester. Prerequisite, Inst. Mgt. 160.

Inst. Mgt. 183. Problems in Housekeeping Management (3). Second semester. Prerequisites, Inst. Mgt. 160 and Inst. Mgt. 182.

D. Foods and Nutrition

Associate Professor Braucher; Assistant Professors Cornell, Peers; Instructors Collins, Duke.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Foods 100. Food Economics (2). One lecture and one laboratory period a week, first semester. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3.

Foods 101. Meal Service (2). Two laboratory periods a week, first and second semesters. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3.

Cornell, Duke.

Foods 102. Experimental Foods (3). One lecture and two laboratory periods a week, first semester. Laboratory fee, \$7.00. Prerequisites, Foods 2, 3; Organic Chemistry, Chem. 31, 32, 33, 34.

Peers.

Foods 103. Demonstrations (2). Two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisites, Foods 1 or 2, 3; Tex. 1. Clo. 20 or Pr. Art. 20.

Peers

Foods 104. Advanced Foods (2). Two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3. Peers.

Foods 105. Foods of Other Countries (3). One lecture and two laboratory periods a week, second semester. Alternate years. Laboratory fee, \$7.00. Prerequisite, Foods 1 or 2, 3, or equivalent.

Peers.

Nut. 110. Nutrition (3). First semester. Prerequisites, Foods 2, 3; Organic Chemistry, Chem. 31, 32, 33, 34. Laboratory fee, \$7.00. Braucher.

Nut. 111. Child Nutrition (2). One lecture and one laboratory period a week, second semester. Prerequisite, Foods 1 or 2, 3; Nut. 110 or 10. Collins.

Nut. 112. Dietetics (3). One lecture and two laboratory periods a week, second semester. Laboratory fee, \$7.00. Prerequisite, Nut. 110. Braucher.

Nut. 113. Diet and Disease (2). Second semester. Alternate years. Prerequisite, Nut 110.

FOR GRADUATES

Foods 200. Advanced Experimental Foods (3-5). Laboratory fee, \$7.00. Second semester.

Nut. 210. Readings in Nutrition (3). First semester.

Nut. 211. Problems in Nutrition (3-5). First and second semesters.

Nut. 212. Nutrition for Community Service (3). First semester.

Foods and Nut. 204. Recent Advances in Foods and Nutrition (2-3). Second semester.

Foods and Nut. 220. Seminar (1, 1). First and second semesters.

Foods and Nut. 221. Research. First and second semesters. Laboratory fee, \$7.00.

HORTICULTURE

Professors Haut, Kramer, Link, Scott, Stark, Walls; Associate Professors Caldwell, Shanks, Shoemaker; Instructor Todd.

This Department offers graduate work in the fields of Floriculture and

Ornamental Horticulture, Horticultural Processing, Olericulture, and Pomology leading to the Master of Science or Doctor of Philosophy degrees.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Hort. 101, 102. Technology of Fruits (2, 2). Two hours a week, first and second semesters. Prerequisite, Bot. 101. Thompson.
- Hort. 103, 104. Technology of Vegetables (2, 2). Two hours a week, first and second semesters. Prerequisite, Bot. 101. Stark.
- Hort. 105. Technology of Ornamentals (2). Two hours a week, first semester. Prerequisite, Bot. 101. Link.
- Hort. 106. World Fruits and Nuts (2). Second semester. Haut.
- Hort. 107, 108. Plant Materials (3, 3). Two lectures and one laboratory period a week, first and second semesters. Prerequisite, Bot. 11 or equivalent. Enright.
- Hort. 114. Systematic Pomology (3). Two lectures and one laboratory period a week, first semester. Given in alternate years. Haut.
- Hort. 116. Systematic Olericulture (3). Two lectures and one laboratory period a week, first semester. Given in alternate years.
- Hort. 122. Special Problems (2, 2). First and second semesters. Credit arranged according to work done. For major students in horticulture or botany. Staff.
- Hort. 123. Grades and Standards for Canned and Frozen Products (2). Second semester. One lecture and one laboratory period a week. Prerequisites, Hort. 124.
- Hort. 124. Quality Control (3). First semester. Two lectures and one laboratory period a week. Prerequisite, Hort. 58, 155, 156.
- Hort. 126. Nutritional Analyses of Processed Crops (2). Second semester. Two laboratory periods a week. Prerequisites, Chem. 33 and 34, Bot. 101, Hort. 123.
- Hort. 150, 151. Commercial Floriculture (3, 3). First and second semesters. Two lectures and one laboratory period a week. Prerequisites, Bot. 1, Hort. 11. Link.
- Hort. 155. Commercial Processing I (3). First semester. Two lectures and one laboratory period a week. Laboratory fee, \$5.00. Prerequisites, Chem. 32, 34, Hort. 61.
- Hort. 156. Commercial Processing II (2). Second semester. One lecture and one laboratory period a week. Prerequisite, Hort. 155.

Hort. 159. Nursery Management (3). Second semester. Two lectures and one laboratory period a week. Prerequisites, or concurrently, Hort. 62, 107, 108. Enright.

FOR GRADUATES

Hort. 200. Experimental Procedures in Biological Sciences (3). First semester. Prerequisite, permission of instructor. Haut.

Hort. 201, 202. Experimental Pomology (3, 3). First and second semesters. Prerequisite, Bot. 101. Thompson.

Hort. 203, 204. Experimental Olericulture (2, 2). First and second semesters. Prerequisite, Bot. 101. Stark.

Hort. 205. Experimental Olericulture (2). First Semester. Prerequisite, Bot. 101.

Hort. 206. Experimental Floriculture (3). First semester. Prerequisite, Bot. 101. Link.

Hort. 207. Methods of Horticultural Research (3). Second semester. One lecture and one four-hour laboratory period a week. Scott.

Hort. 208. Advanced Horticultural Research (2-12). First and second semesters. Credit granted according to work done. Staff.

Hort. 209. Advanced Seminar (1, 1). First and second semesters. Five credit hours for five semesters can be obtained. Haut and Staff.

Hort. 210. Experimental Processing (2). Second semester. Prerequisite, permission of instructor. Kramer.

MATHEMATICS

Professors Martin, Hall Jackson, Weinstein*; Associate Professor Diaz*; Assistant Professors Good, Haywood, Ludford, Young; Research Associate Weinberger*; Instructors Brewster, Collins, Cuthill, Greenspan, McArthur, McLean, Mehegan, Penez, Shepherd, Spencer, Thickstun; Junior Instructor Cato.

The Colloquium meets weekly for reports on the research of the faculty and graduate students, and for expository lectures on papers published in current mathematical journals.

In addition to satisfying the Graduate School requirements, a student, before being recommended for admission to candidacy for the degree of Master of Arts with a major in mathematics, must demonstrate a reading knowledge of one foreign language of scientific importance and must pass an oral preliminary examination covering undergraduate and graduate work in both major and minor fields of study.

*Member of the Institute for Fluid Dynamics and Applied Mathematics.

When a student presents himself for the preliminary examination for the degree of Doctor of Philosophy with a major in mathematics, he is expected to have acquired a background of mathematical knowledge equivalent to the following group graduate studies; Analysis, four semesters; Algebra, two semesters; Geometry or Topology, two semesters; Applied Mathematics or Physics, two semesters.

A student who intends to present a minor in mathematics of nine credit hours for the degree of Doctor of Philosophy must include at least three credit hours of 200 courses in mathematics. If the program includes 12 credit hours or more, at least six credit hours must be in 200 courses in mathematics.

A. Algebra

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Math. 100, 101. Higher Algebra (3, 3).** Prerequisite, Math. 21 or equivalent. Good.
Math. 102. Theory of Equations (3). Second semester. Prerequisite, Math. 21 or equivalent. Good.
Math. 103. Introduction to Modern Algebra (3). First semester. Prerequisite, Math. 21 or equivalent. Good.
Math. 106. Introduction to the Theory of Numbers (3). Second semester. Prerequisite, Math. 21 or equivalent. Good.

FOR GRADUATES

- Math. 200, 201. Modern Algebra (3, 3).** Prerequisite, Math. 103 or consent of instructor.
Math. 202. Matrix Theory (3). Second semester. Prerequisite, Math. 103 or consent of instructor. Good.
Math. 204, 205. Topological Groups (3, 3). Prerequisite, consent of instructor. Hall, Good.
Math. 271. Selected Topics in Algebra (3). Arranged.

B. Analysis

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Math. 110, 111. Advanced Calculus (3, 3).** First and second semesters. Prerequisite, Math. 21 or equivalent. Hall.
Math. 114. Differential Equations (3). Second semester. Prerequisite, Math. 21 or equivalent. Spencer.
Math. 115. Partial Differential Equations (3). Prerequisite, Math. 114 or equivalent. Spencer.

Math. 116, 118. Introduction to Complex Variable Theory (3, 3). Prerequisite, Math. 21 or equivalent. Open to students in engineering and the physical sciences. Graduate students in mathematics should enroll in Math. 210, 211.
Ludford.

Math. 117. Fourier Series (3). Prerequisite, Math. 114 or equivalent.
Ludford.

Math. 119, 120. Intermediate Differential Equations (3, 3). First and second semesters. Prerequisites, Math. 114, for Math. 119; Math. 115, for Math. 120.
Spencer.

FOR GRADUATES

Math. 210, 211. Functions of a Complex Variable (3, 3). Prerequisite, Math. 111 or equivalent.
Young.

Math. 213, 214. Functions of a Real Variable (3, 3). Prerequisite, Math. 111 or equivalent.
Young.

Math. 215, 216. Advanced Differential Equations (3, 3). Prerequisite, Math. 111 and 116, or 210.
Martin.

Math. 272. Selected Topics in Analysis (3). Arranged.

C. Geometry and Topology

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Math. 122, 123. Elementary Topology (3, 3). Prerequisite, Math. 21 or equivalent.
Hall.

Math. 124, 125. Introduction to Projective Geometry (3, 3). Prerequisite, Math. 21 or equivalent.
Jackson.

Math. 126, 127. Introduction to Differential Geometry and Tensor Analysis (3, 3). Prerequisite, Math. 21 or equivalent.
Jackson.

Math. 128, 129. Higher Geometry (3, 3). Prerequisite, Math. 21 or consent of instructor. Math. 128 is not a prerequisite for Math. 129. Open to students in the College of Education.
Jackson.

FOR GRADUATES

Math. 220, 221. Differential Geometry (3, 3). Prerequisite, Math. 111 and 134, or consent of instructor.
Jackson.

Math. 222. Foundations of Geometry (3). Prerequisite, Math. 124 or consent of instructor.
Jackson.

Math. 223, 234. Algebraic Topology (3, 3). Prerequisite, Math. 103 and 111, or equivalent.
Spencer.

Math. 225, 226. Set-theoretic Topology (3, 3). Prerequisite, Math. 111 or equivalent.

Hall.

Math. 227. Tensor Analysis (3). First semester. Prerequisite, Math. 111 and 134, or equivalent.

Weinberger.

Math. 273. Selected Topics in Geometry and Topology (3). Arranged.

D. Applied Mathematics

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Math. 130, 131. Analytic Mechanics (3, 3). Prerequisite, Math. 21 or equivalent.

Ludford.

Math. 132, 133. Advanced Mathematics for Engineers and Physicists (3, 3). Prerequisite, Math. 21 or equivalent.

Haywood.

Math. 134. Vector Analysis (3). Second semester. Prerequisite, Math. 21 or equivalent.

Haywood.

Math. 135. Numerical Analysis (3). Prerequisite, Math. 114 or equivalent or concurrent enrolment in Math. 114.

Young.

Math. 139. Operational Calculus (3). First semester. Prerequisite, Math. 64 or equivalent.

Haywood.

FOR GRADUATES

Math. 230, 231. Applied Mathematics (3, 3). Prerequisite, Math. 111 and 114, or equivalent.

Weinstein.

Math. 232, 233. Partial Differential Equations of Mathematical Physics (3, 3). Prerequisite, Math. 111 and 114, or equivalent.

Diaz.

Math. 234. Potential Theory (3). Second semester. Prerequisite, Math. 111 or equivalent.

Payne.

Math. 235. Advanced Numerical Analysis (3). Prerequisite, Math. 114 or equivalent, and Math. 135 or consent of instructor.

Young.

Math. 236. Mathematical Theory of Hydrodynamics (3). Second semester. Prerequisite, Math. 116, or equivalent.

Weinstein.

Math. 237. Mathematical Theory of Elasticity (3). First semester. Prerequisite, Math. 111, or equivalent.

Weinstein.

Math. 238. Mathematical Theory of Continuous Media (3). Prerequisite, Math. 134 or consent of instructor.

Math. 239. Mathematical Theory of Electricity and Magnetism (3). First semester. Prerequisite, Math. 134 or consent of instructor.

Math. 240. Advanced Numerical Analysis (3). Prerequisite, Math. 235, or equivalent.

Math. 274. Selected Topics in Applied Mathematics (3). Arranged.

E. Research

FOR GRADUATES

Math. 298. Proseminar in Research (1). Second semester. Prerequisite, one semester of graduate work in mathematics. Spencer.

Math. 300. Research. Arranged.

MECHANICAL ENGINEERING

Professors Younger, Shreeve, Jackson; Associate Professors Allen, Hayleck, Long; Assistant Professors Eyler, Guard, Hennick, Read, Ojalvo, Instructors Shames, Thomas, Thorson.

Instruction and research facilities are available for the degrees of Master of Science and Doctor of Philosophy in Mechanical Engineering.

Registration in six credits of research (M. E. 221, Research) for the thesis is required. Doctor of Philosophy.

One of the minors must be Mathematics, in which 12 credits in graduate (200) are required.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

M. E. 100. Thermodynamics (3). First semester. Two lectures and one laboratory period a week. Prerequisites, Phys. 21, Math. 21, Laboratory fee, \$3.00.

M. E. 101. Heat Transfer (2). First semester. Two lectures a week. Prerequisites, M. E. 54 and M. E. 100.

M. E. 102. Heating and Air Conditioning (3). First semester. Two lectures and one laboratory period a week. Prerequisites, M. E. 100, M. E. 54; M. E. 101 concurrently.

M. E. 103. Refrigeration (3). Second semester. Two lectures and one laboratory period a week. Prerequisites, M. E. 100, M. E. 101, M. E. 102. Laboratory fee, \$3.00.

M. E. 104, 105. Prime Movers (4, 4). First and second semesters. Three lectures and one laboratory period a week. Prerequisites, Mech. 52, M. E. 54, M. E. 100.

M. E. 106, 107. Mechanical Engineering Design (4, 4). First and second semesters. Two lectures and two laboratory periods a week. Prerequisites, Mech. 52, M. E. 53.

- M. E. 108, 109. **Mechanical Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Laboratory fee, \$3.00.

FOR GRADUATES

- M. E. 200, 201. **Advanced Dynamics (3, 3).** First and second semesters. Prerequisites, Mech. 52, Math. 64, M. E. 107; M. E. 109. Younger, Long.
- M. E. 202, 203. **Applied Elasticity (3, 3).** First and second semesters. Prerequisites, Mech. 52, Math. 54, M. E. 107. Younger.
- M. E. 204, 205. **Advanced Thermodynamics and Heat Transfer. (3, 3).** First and second semesters. Three lectures a week. Prerequisites, M. E. 101, M. E. 104, M. E. 105, Math. 64. Shreeve, Allen.
- M. E. 206, 207. **Advanced Machine Design (3, 3).** First and second semesters. Two lectures and one laboratory period a week. Prerequisite, Math. 64, M. E. 107. Jackson.
- M. E. 208, 209. **Steam Power Plant Design (3, 3).** First and second semesters. One lecture and two laboratory periods. Prerequisite, M. E. 105. Shreeve.
- M. E. 210, 211. **Advanced Fluid Mechanics (3, 3).** First and second semesters. Prerequisites, M. E. 54, Math. 64.
- M. E. 212, 213. **Advanced Steam Power Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M. E. 204, 205. Shreeve.
- M. E. 214, 215. **Advanced Applied Mechanics Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisites, registration in M. E. 200, 201 and M. E. 202, 203. Shames.
- M. E. 216, 217. **Advanced Internal Combustion Engine Design (3, 3).** First and second semesters. One lecture and two laboratory periods a week. Prerequisites, M. E. 104, 105; M. E. 106, 107 and registration in M. E. 200, 201 and M. E. 204, 205. Shreeve.
- M. E. 218, 219. **Advanced Internal Combustion Engine Laboratory (2, 2).** First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M. E. 216, 217. Shreeve.
- M. E. 220. **Seminar.** Credit in accordance with work outlined by mechanical engineering staff. Staff.
- M. E. 221. **Research.** Credit in accordance with work outlined by mechanical engineering staff. Research in any field of mechanical engineering as applied mechanics, heat transfer, thermodynamics, heat, power, etc. Staff.
- M. E. 222. **Advanced Metallography (3).** First semester. Two lectures and one laboratory period a week. Prerequisite, M. E. 53, Mech. 52. Jackson.

- M. E. 223, 224.** Steam and Gas Turbine Design (3, 3). First and second semesters. Three lectures a week. Prerequisites, M. E. 101, M. E. 104, M. E. 105, Math. 64. Shreeve.
- M. E. 225, 226.** Advanced Properties of Metals and Alloys. (2, 2). First and second semesters. Two lectures a week. Prerequisite, Mech. 52, M. E. 53, M. E. 106, M. E. 107. Jackson.
- M. E. 227, 228.** Theory of Elasticity (3, 3). First and second semesters. Three lectures a week. Prerequisites, Mech. 52, M. E. 53, M. E. 106, M. E. 107, Math. 64. Younger.
- M. E. 229, 230.** Jet Propulsion (3, 3). Prerequisites, M. E. 101, M. E. 104, M. E. 105. Shreeve.

PHILOSOPHY

Professor Garvin; Assistant Professors Dewey and Robinson; Instructor Wiig.

This Department is now offering the Master of Arts degree and providing minor work for related areas.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Phil. 101.** Ancient Philosophy (3). First semester. Robinson.
- Phil. 102.** Modern Philosophy (3). Second semester. Prerequisite, Phil. 101. Robinson.
- Phil. 111.** Medieval Philosophy (3). Second semester. (Not offered in 1953-1954.) Prerequisite, Phil. 101. Robinson, Wiig.
- Phil. 112.** Recent and Contemporary Philosophy (3). First semester. Prerequisite, Phil. 101 and 102, or written permission of instructor. Dewey.
- Phil. 120.** Oriental Philosophy (3). Second semester. Robinson.
- Phil. 121.** American Philosophy (3). First semester. Dewey.
- Phil. 130.** The Conflict of Ideals in Western Civilization (3). Second semester. Dewey.
- Phil. 151.** Ethics (3). First semester. Garrin.
- Phil. 153.** Philosophy of Art (3). Second semester. Dewey.
- Phil. 154.** Political and Social Philosophy (3). Second semester. Dewey, Wiig.
- Phil. 155.** Logic (3). Second semester. Wiig, Garvin.
- Phil. 156.** Philosophy of Science. (3). First semester. Robinson.
- Phil. 160.** Metaphysics (3). Second semester. Prerequisite, Phil 101 and 102, or the written permission of the instructor. Robinson.
- Phil. 191, 192, 193, 194.** Topical Investigations (1-3). Each semester. Staff.

FOR GRADUATES

Graduate instruction in the Department of Philosophy is carried on mainly by independent investigation of special topics under individual supervision. Any of the courses listed below may be elected more than once. Course selections require the approval of the department chairman.

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| Phil. 201. Research in Philosophy (3). Each semester. | Staff. |
| Phil. 203. Selected Problems in Philosophy (3). Each semester. | Staff. |
| Phil. 205. Seminar in the History of Philosophy (3). Second semester. | Staff. |
| Phil. 206. Seminar in the Problems of Philosophy (3). First semester. | Staff. |

PHYSICAL EDUCATION, RECREATION AND HEALTH

Dean Fraley; Professors Deach, Johnson, Massey, Mohr; Associate Professors Cronin, Harvey, Kehoe, Tompkins, Shipley, Woods; Assistant Professors Field, Flinchbaugh, Husman, Key, Krouse, McCormic, Wessel; Instructors Cheek, Haverstick, Howarth, Madden, Stewart, Teague, Neyendorff.

The graduate student majoring in Physical Education, Recreation, or Health Education may pursue any of the following degrees: Master of Education, Master of Arts in Education, Doctor of Education, and Doctor of Philosophy. Undergraduate requirements to be made of every candidate before admission to candidacy for a graduate degree in Physical Education are: basic sciences (human anatomy and physiology, physiology of exercise), kinesiology, therapeutics, sport skills, methods, human development, measurement, administration, and student teaching. In cases where a student has had successful experience in teaching Physical Education, the prerequisites of sport skills, methods, and student teaching may be waived. Undergraduate prerequisites in Recreation are: psychology, sociology, principles, administration, basic sciences, recreational activities, and practical experience. Undergraduate prerequisites in Health Education are: biological sciences, bacteriology, human anatomy and physiology, nutrition, chemistry, psychology, measurement, administration, principles, and field work.

Every graduate student majoring in Physical Education, Recreation, or Health Education is required to take the following courses (or transfer their equivalent) before taking the qualifying examination: P. E. 201, Foundations in Physical Education, Recreation and Health; P. E. 210, Methods and Techniques of Research; and P. E. 230, Course Material Survey. In addition, every graduate student must register for and complete P. E. 200, Seminar in Physical Education, Recreation, and Health, at some time during his graduate career.

A. Physical Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- P. E. 120. Physical Education for the Elementary School (3). First and second semesters and summer.

- P. E. 130. Fundamentals of Body Dynamics (3). First and second semesters and summer. Wessel.
- P. E. 150. Physical Education for Aviation Personnel (3). First and second semesters and summer. Johnson.
- P. E. 160. Scientific Bases of Movement Applied (3). First and second semesters and summer. Prerequisite, P. E. 100. Wessel.
- P. E. 180. Measurement in Physical Education and Health (3). First and second semesters. Two lectures and two laboratory periods a week. Massey.
- P. E. 181. Training and Conditioning (3). Second semester. Two lectures and two laboratory periods a week. Prerequisites, Zool. 14, 15, 53. Wyre.
- P. E. 182. History of Dance (3). First semester. Prerequisites, P. E. 52, 54, 56, 58, or permission of instructor. Madden.
- P. E. 190. Administration and Supervision of Physical Education, Recreation and Health (3). First and second semesters, and summer. Johnson.

FOR GRADUATES

- P. E. 200. Seminar in Physical Education, Recreation and Health (1). First and second semesters and summer. Staff.
- P. E. 201. Foundations in Physical Education, Recreation and Health (3). First and second semesters and summer. Deach, Johnson, Field.
- P. E. 203. Supervisory Techniques in Physical Education, Recreation and Health (3). First and second semesters and summer. Mohr.
- P. E. 205. Administration of Athletics (3). First and second semesters and summer. Fraley.
- P. E. 210. Methods and Techniques of Research (3). First and second semesters and summer. Mohr.
- P. E. 220. Quantitative Methods (3). First and second semesters and summer. Massey.
- P. E. 230. Source Material Survey (3). First and second semesters and summer. Massey.
- P. E. 250. Mental and Emotional Aspects of Physical Education Activities (3). First and second semesters and summer. Johnson.
- P. E. 280. Scientific Bases of Physical Fitness (3). First and second semesters and summer. Massey.
- P. E. 288. Special Problems in Physical Education, Recreation and Health (1-6). First and second semesters and summer. Staff.

- P. E. 289. Research-Thesis (1-5). First and second semesters and summer. Staff.
- P. E. 290. Administrative Direction of Physical Education, Recreation and Health (3). First and second semesters and summer. Johnson.
- P. E. 291. Curriculum Construction in Physical Education and Health (3). First and second semesters and summer. Mohr.

B. Health Education

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Hea. 160. Problems in School Health Education (2-6). Summer only. Key, McCormic.
- Hea. 190. Organization and Administration of Health Education (3). Key. FOR GRADUATES
- Hea. 220. Principles and Practice of Health Education (3). First and second semesters and alternate summers. Johnson.
- Hea. 230. Public Health Education (3). First and second semesters and summer. Key.
- Hea. 240. Advancements in Modern Health (3). First and second semesters and summer. Key.

C. Recreation

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Rec. 130. Leadership Techniques and Practices (3). First and second semesters.
- Rec. 150. Camp Management (3). First and second semesters and summer. Harvey.
- Rec. 170. Principles and Practice of Recreation (3). First and second semesters. Harvey.
- Rec. S184. Outdoor Education (6). Summer only. Mitchell.
- Rec. 190. Organization and Administration of Recreation (3). First and second semesters. Harvey.

FOR GRADUATES

- Rec. 210. Modern Trends in Recreation (3). First and second semesters and summer. Harvey.
- Rec. 220. Hospital Recreation (3). First and second semesters and summer. Harvey.
- Rec. 230. Industrial Recreation (3). First and second semesters and summer. Harvey.
- Rec. 240. Philosophy of Recreation (2). First and second semesters and summer. Harvey.

PHYSICS

Professors Morgan, Myers; Part-time Professors Brickwedde, de Launay, Kennard; Associate Professor Iskraut; Assistant Professors Anderson, Grant, Krumbein.

It is expected that the following courses should have been taken preliminary to graduate work. Any deficiencies should be made up at once. A limited amount of graduate credit will be allowed for courses so taken.

General Physics	Electricity and Magnetism
Heat	Modern Physics
Intermediate Mechanics	Differential and Integral Calculus
Optics	

Candidates for both the Master's and Doctor's degree are required to take Introduction to Theoretical Physics, (Physics 200). The course runs for a full year and carries 10 semester hours credit. The minimum prerequisites in mathematics are differential and integral calculus, but advanced calculus and differential equations are recommended.

Candidates for the Doctor's degree should follow the Introduction to Theoretical Physics with Quantum Mechanics. No other courses are specifically required. It is recommended in the selection of further courses that the student avoid overspecialization in any field. In particular he should take a wide variety of classical courses as well as courses in selected fields of Modern Physics.

Candidates for advanced degrees in Physics may have a minor in either chemistry, mathematics, engineering, applied physics, or a satisfactory combination of two or more of the group.

Thesis (Ph.D.): The student must outline his topic to the graduate staff for approval. This outline must clearly set forth the nature of the problem, proposed method of procedure and the possible results that may be obtained. The completed thesis will also be presented to the graduate staff for approval.

Off-Campus Courses: The Physics Department offers courses at convenient times and places so as to accommodate the greatest number of students. In order to facilitate graduate study and supervision of research in the Washington area, the Department has part-time professors in certain government laboratories where a large number of students are interested in graduate study and where there are facilities for research. At government agencies where there is no part-time professor, employees desiring to do graduate work in physics should contact a member of the graduate staff in the Physics Department.

A. General Physics

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Phys. 100. Advanced Experiments. Three hours of laboratory work for each credit hour. One or more credits may be taken concurrently. Prerequisites, Phys. 52 or 54. Laboratory fee, \$6.00 per credit hour. Krumbein.

- Phys. 102. Optics (3).** Three lectures a week, second semester. Prerequisites, Phys. 11 or 21; Math. 21. Krumbein.
- Phys. 104. Electricity and Magnetism (4).** Four lectures a week, first semester. Prerequisites, Phys. 11 or 21; Math. 21. Grant.
- Phys. 106, 107. Theoretical Mechanics (3, 3).** Three lectures a week, first and second semesters. Prerequisites, Phys. 51 or consent of instructor. Morgan.
- Phys. 112, 113. Modern Physics (2, 2).** Two lectures a week. Prerequisite, Phys. 104. Myers.
- Phys. 120, 121. Experimental Nuclear Physics (3, 3).** Two lectures and one laboratory a week. Prerequisite, Phys. 113 and two credits of Phys. 100. de Launay.
- Phys. 126. Kinetic Theory of Gases (3).** Prerequisite, Phys. 107 and Math. 21, or equivalent.

FOR GRADUATES

Of the following courses, 200, 201, 212 and 213 are given every year; all others will be given according to the demand.

- Phys. 200, 201. Introduction to Theoretical Physics (5, 5).** Five lectures a week, first and second semesters. Myers.
- Phys. 202, 203. Advanced Dynamics (2, 2).** Two lectures a week. Prerequisite, Phys. 200.
- Phys. 204. Electrodynamics (4).** Four lectures a week. Prerequisite, Phys. 201. Iskraut.
- Phys. 206. Physical Optics (3).** Prerequisite, Phys. 201. Myers.
- Phys. 208, 209. Thermodynamics (2, 2).** Prerequisite, Phys. 201 or equivalent. Betchov.
- Phys. 210, 211. Statistical Mechanics and the Kinetic Theory of Gases (2, 2).** Two lectures a week. Prerequisites, Phys. 112 and 201. Newell.
- Phys. 212, 213. Introduction to Quantum Mechanics (3, 3).** Three lectures a week, first and second semesters. Prerequisite, Phys. 213. Myers.
- Phys. 214, 215. Theory of Atomic Structure and Spectral Lines (2, 2).** Two lectures a week. Prerequisite, Phys. 213.
- Phys. 216, 217. Molecular Structure (2, 2).** Two lectures a week. Prerequisite, Phys. 213. Brickwedde.
- Phys. 222, 223. Boundary-Value Problems of Theoretical Physics (2, 2).** Prerequisite, Phys. 201.
- Phys. 228, 229. The Electron (2, 2).** Prerequisites, Phys. 204 and Phys. 213. de Launay.

- Phys. 230. Seminar (1). First and second semesters.
- Phys. 234, 235. Nuclear Physics (2, 2). Prerequisite, Phys. 213. de Launay.
- Phys. 236. Theory of Relativity (3). Prerequisite, Phys. 200. Iskraut.
- Phys. 238. Quantum Theory—selected topics (3). Prerequisite, Phys. 212 and 236. Iskraut.
- Phys. 242, 243. Theory of Solids (2, 2). Two lectures a week, first and second semesters. Prerequisite, Phys. 213. Myers.
- Phys. 248, 249. Special Topics in Modern Physics (2, 2). Two lectures a week. Prerequisite, Calculus and consent of instructor.
- Phys. 250. Research. Credit according to work done. Laboratory fee, \$6.00 per credit hour.

B. Applied Physics

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Phys. 101. Laboratory Arts (1). Four hours laboratory a week, second semester. Prerequisite, two credits of Phys. 100. Laboratory fee, \$6.00. Morgan.
- Phys. 103. Applied Optics (3). Three lectures a week, first semester. Prerequisite, Phys. 102.
- Phys. 105. Electricity and Magnetism (2). Two lectures a week, second semester. Prerequisite, Phys. 104. Grant.
- Phys. 108. Physics of Vacuum Tubes (3). Three lectures a week, first semester. Prerequisite, Phys. 104. Grant.
- Phys. 109. Electronic Circuits (5). Five lectures a week, second semester. Prerequisite, Phys. 105. Grant.
- Phys. 110. Applied Physics Laboratory (1, 2, or 3). Three hours laboratory work for each credit hour. One to three credits may be taken concurrently. Prerequisites, Phys. 52 or Phys. 54; and one credit in Phys. 100.
- Phys. 114, 115. Introduction to Biophysics (2, 2). First and second semesters. Two lectures a week. Prerequisite, intermediate Physics and Calculus. Morowitz.
- Phys. 116, 117. Fundamental Hydrodynamics (3, 3). Three lectures a week. Prerequisites, Phys. 107 and Math. 21.

FOR GRADUATES

- Phys. 218, 219. X-Rays and Crystal Structure (3, 3). Three lectures a week, first and second semesters. Morgan.
- Phys. 220. Application of X-Ray and Electron Diffraction Methods (2). Two laboratory periods a week. Morgan.

Phys. 224, 225. Supersonic Aerodynamics and Compressible Flow (2, 2). Prerequisite, Phys. 201.

Phys. 226, 227. Theoretical Hydrodynamics (3, 3). Prerequisite, Phys. 201.

Phys. 232, 233. Hydromechanics Seminar (1, 1). Kennard.

Phys. 240, 241. Theory of Sound and Vibrations (3, 3). Prerequisite, Phys. 201.

Phys. 244, 245. Aerophysics (2, 2). Prerequisite, consent of the instructor.

Phys. 246, 247. Special Topics in Fluid Dynamics (2, 2). Prerequisites, advanced graduate standing and consent of the instructor.

POULTRY HUSBANDRY

Professors Jull, Shaffner, Combs, Mary Juhn, Mary S. Shorb

Course work and research leading to the Master of Science and the Doctor of Philosophy are offered.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

P. H. 104. Technology of Market Eggs and Poultry (3). Two lectures and one laboratory period a week, first semester.

A. E. 117. Economics of Marketing Eggs and Poultry (3). Three lectures a week, second semester. (See A. E. 117.) Smith.

P. H. 107. Poultry Industrial and Economic Problems (2). First semester. Staff.

P. H. 108. Special Poultry Problems (1-2). Assigned problems, first and second semesters. Staff.

Poultry Hygiene. See V. S. 107.

Avian Anatomy. See V. S. 108.

FOR GRADUATES

P. H. 201. Advanced Poultry Genetics (3). First semester. Prerequisite, P. H. 100, or equivalent. Jull.

P. H. 202. Advanced Poultry Nutrition (3). Two lectures and one laboratory period a week, second semester. Prerequisite, P. H. 101, or equivalent. Combs.

P. H. 203. Physiology of Reproduction of Poultry (3). Two lectures and one laboratory period a week, first semester. Prerequisite, P. H. 102, or equivalent. Shaffner

P. H. 204. Poultry Seminar (1). First and second semesters. Staff.

P. H. 205. Poultry Literature (1-4). First and second semesters. Staff.

- P. H. 206. **Poultry Research (1-6).** Credit in accordance with work done.
Staff.
- P. H. 207. **Poultry Research Techniques (2).** One lecture and one laboratory period a week, first semester.
Staffner, Combs.

PSYCHOLOGY

Professors Andrews, Cofer, Hackman, Sprowls; Associate Professors Ayers, Gustad, Ross; Assistant Professors Heintz, McGinnies.

All graduate students who have deficiencies in their undergraduate preparation in psychology will be required to remove the particular deficiencies by completing the required courses or by individual study. Deficiencies in the following course areas can be removed only by registering in and satisfactorily completing these courses: Experimental Psychology, Statistical Methods, and Tests and Measurements.

Departmental requirements toward the Master of Arts or the Master of Science degrees: 14-hours in the following courses: Psych. 191-192, 198, and 252-253; 6 hours of research (Psych. 290-291); a minimum of 6 hours in advanced courses in area of specialization; and 8 hours in an approved minor field; total 34 hours.

Departmental requirements toward the Doctor of Philosophy degree: 24 hours in the following courses, Psych. 191-192, 198, 202, 203, 205-206, 252-253, which constitute a minor in General Psychology; 18 hours of graduate research including 12 hours for Ph.D. Thesis; a minimum of 30 hours in areas of specialization; total 72 hours.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Graduate credit will be assigned only for students certified by the Department of Psychology as qualified for graduate standing.

Psych. 106. Statistical Methods in Psychology (3). First and second semesters. Prerequisite, Psych 1. Hackman.

Psych. 110. Advanced Educational Psychology (3). First semester. Prerequisite, Psych. 1 or H. D. Ed. 101. Heintz.

Psych. 121. Social Psychology (3). First and second semesters. Prerequisite, Psych. 1 Heintz, McGinnies.

Psych. 122. Advanced Social Psychology (3). Second semester. Prerequisite, Psych. 121 and consent of instructor. Heintz, McGinnies.

Psych. 125. Child Psychology (3). First semester. Prerequisite, Psych. 1. Heintz.

Psych. 126. Developmental Psychology (3). First semester. Prerequisite, Psych. 1. Heintz.

- Psych. 128. **Human Motivation** (3). First and second semesters. Prerequisite, Psych. 121. Cofer.
- Psych. 129. **Psychological Aspects of Literature** (3). First semester. Prerequisite, Psych. 131 or permission of instructor. Sprowls.
- Psych. 131. **Abnormal Psychology** (3). First and second semesters. Prerequisite, 3 courses in Psychology. Sprowls.
- Psych. 136. **Applied Experimental Psychology** (3). First semester. Prerequisite, Psych. 1 or 3. Ross.
- Psych. 140. **Psychological Problems in Advertising** (3). First semester. Prerequisite, Psych. 1. Hackman.
- Psych. 142. **Techniques of Interrogation** (3). First and second semesters. Prerequisite, Psych. 121. Hackman.
- Psych. 145. **Introduction to Experimental Psychology** (4). First and second semesters. Prerequisite, Psych. 4. Laboratory fee, \$4.00. Ross.
- Psych. 150. **Tests and Measurements** (3). Second semester. Prerequisite, Psych. 106. Laboratory fee, \$4.00. Gustad.
- Psych. 155. **Psychological Techniques in Vocational Counseling** (3). Second semester. Prerequisite, Psych. 150. Gustad.
- Psych. 161. **Industrial Psychology** (3). Second semester. Prerequisite, 6 hours in psychology. Ayers.
- Psych. 167. **Psychological Problems in Aviation** (3). Second semester. Prerequisite, Psych. 1.
- Psych. 180. **Physiological Psychology** (3). First semester. Prerequisite, Psych. 145. Andrews, Ross.
- Psych. 181. **Animal Behavior** (33). (Same as Zool. 181). Second semester. Prerequisite, consent of instructor. Ross.
- Psych. 191, 192. **Advanced General Psychology** (3, 3). First and second semesters. Prerequisite, Psych. 145. Ross.
- Psych. 194. **Independent Study in Psychology** (1-3). First and second semesters. Prerequisite, written consent of individual faculty supervisor. Staff.
- Psych. 195. **Minor Problems in Psychology** (1-3). First and second semesters. Prerequisite, written consent of individual faculty supervisor. Staff.
- Psych. 198. **Proseminar: Professional Aspects of Psychological Science** (2). Second semester. Prerequisite, consent of faculty advisor. Staff.

FOR GRADUATES

- Psych. 202. Seminar in Advanced Experimental Psychology (2). First semester. Prerequisite, permission of instructor. Andrews.
- Psych. 203, 304. Graduate Seminar (2, 2). First and second semesters. Prerequisite, consent of instructor. Staff.
- Psych. 205, 206. Historical Viewpoints and Current Theories in Psychology (3, 3). First and second semesters. Hackman, Cofer.
- Psych. 210. Occupational Information (3). Prerequisite, permission of instructor. Ayres.
- Psych. 211. Job Analysis and Evaluation (3). First semester. Prerequisite, permission of instructor. Ayres.
- Psych. 220, 221. Counseling Techniques (3, 3). First and second semesters. Prerequisite, permission of instructor. Gustad.
- Psych. 222. Rehabilitation Techniques (3). Second semester. Prerequisite, Psych. 220.
- Psych. 223. Diagnosis and Correction of Reading Difficulties (3). Second semester. Prerequisite, Psych. 220.
- Psych. 225. Participation in Counseling Center (1-3). Second semester. Prerequisite, Psych. 220. Gustad.
- Psych. 230. Determinants of Human Efficiency (3). Second semester. Ross, Hackman.
- Psych. 231. Training Procedures in Industry (3). First semester. Ayers.
- Psych. 233. Social Organization in Industry (3). Second semester. Ayers.
- Psych. 235. Psychological Aspects of Management-Union Relations (3). Second semester. Prerequisite, consent of instructor. Ayers.
- Psych. 240. Interview and Questionnaire Techniques (3). Second semester. Prerequisite, Psych. 150. Heintz.
- Psych. 241. Controlled Publicity (3). First semester. Prerequisite, consent of instructor. Hackman.
- Psych. 250. Mental Test Theory (2). First semester. Prerequisite, Psych. 253. Gustad.
- Psych. 251. Development of Predictors (3). Second semester. Prerequisite, Psych. 253.
- Psych. 252, 253. Advanced Statistics (3, 3). First and second semesters. Prerequisite, Psych. 106. Hackman, Andrews.
- Psych. 255. Seminar in Psychometric Theory (2). First semester. Prerequisite, Psych. 253. Andrews, Hackman.

- Psych. 260. Individual Tests (3,).** First semester. Prerequisite, Psych. 150. Laboratory fee, \$4.00.
- Psych. 262. Appraisal of Personality (3).** First semester. Prerequisite, Psych. 150.
- Psych. 264. Projective Tests (3).** Second semester. Prerequisite, Psych. 260. Laboratory fee, \$4.00. Prerequisites, Psych. 260 and permission of instructor. Cofer.
- Psych. 266, 267. Theories of Personality and Motivation (3, 3).** First and second semesters. Cofer.
- Psych. 270. Advanced Abnormal Psychology (3).** First semester. Prerequisite, Psych. 131. Cofer.
- Psych. 271. Special Testing of Disabilities (3).** Second semester. Prerequisite, Psych. 270.
- Psych. 272, 273. Individual Clinical Diagnosis (3, 3).** First and second semesters. Prerequisite, Psych. 260. Cofer.
- Psych. 278. Seminar in Clinical Psychology for Teachers (3).** First semester. Prerequisite, consent of instructor. Sprowls.
- Psych. 280. Advanced Psychophysiology (2).** First semester. Prerequisite, consent of instructor. Andrews.
- Psych. 288, 289. Special Problems (1-3).** First and second semesters. Staff.
- Psych. 290, 291. Research for Thesis (credit arranged).** First and second semesters. Staff.

SOCIOLOGY

Professors Hoffsommer, Lejins; Associate Professors Matthews, Melvin, Shankweiler; Assistant Professors Anderson, Rohrer, Roth.

The Department of Sociology grants the degrees of Master of Arts and Doctor of Philosophy. As indicated by the courses listed, the student has a considerable range of choice in selecting specialized fields of sociological study.

Prerequisites for graduate study leading to an advanced degree with a major in sociology consist of either (1) an undergraduate major (totalling at least 24 semester hours) in sociology or (2) 12 semester hours of sociology (including 6 semester hours of advanced courses) and 12 additional hours of comparable work in economics, political science, or psychology. Reasonable substitutes for these prerequisites may be accepted in the case of students majoring in other departments who desire a graduate minor or several courses in sociology.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Soc. 105. Applied Anthropology (3).** Second semester. Anderson.
- Soc. 112. Rural-Urban Relations (3).** First semester. Melvin.

- Soc. 113. The Rural Community (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Hoffsommer.
- Soc. 114. The City (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Schmidt.
- Soc. 115. Industrial Sociology (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Imse.
- Soc. 118. Community Organization (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Roth.
- Soc. 121, 122. Population (3, 3).** Three hours a week, first and second semesters. Prerequisite, Soc. 1, or its equivalent. Imse.
- Soc. 123. Ethnic Minorities (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.
- Soc. 124. The Culture of the American Indian (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Hutchinson.
- Soc. 131. Introduction to Social Service (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Roth.
- Soc. 136. Sociology of Religion (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Anderson.
- Soc. 141. Sociology of Personality (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Motz.
- Soc. 144. Collective Behavior (3).** Second semester. Prerequisite, Soc. 1, or its equivalent. Melvin.
- Soc. 145. Social Control (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Motz.
- Soc. 147. Sociology of Law (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.
- Soc. 153. Juvenile Delinquency (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.
- Soc. 154. Crime and Delinquency Prevention (3).** Second semester. Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.
- Soc. 156. Institutional Treatment of Criminals and Delinquents (3).** Second semester. Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.
- Soc. 161. The Sociology of War (3).** First semester. Staff.
- Soc. 171. Family and Child Welfare (3).** First semester. Prerequisite, Soc. 1, or its equivalent. Shankweiler.

- Soc. 173. Social Security (3). First semester. Prerequisite, Soc. 1, or its equivalent. Hutchinson.
- Soc. 174. Public Welfare (3). Second semester. Prerequisite, Soc. 1, or its equivalent. Roth.
- Soc. 183. Social Statistics (3). Second semester. Prerequisite, Soc. 1, or its equivalent. Imse.
- Soc. 185. Advanced Social Statistics (3). Second semester. Prerequisite, Soc. 183, or its equivalent. Imse.
- Soc. 186. Sociological Theory (3). Second semester. Prerequisite, Soc. 1, or its equivalent. Schmidt.
- Soc. 196. Senior Seminar (3). Second semester. Hoffsommer.

FOR GRADUATES

- Soc. 201. Methods of Social Research (3). First semester. Hoffsommer.
- Soc. 215. Community Studies (3). First semester. Hoffsommer.
- Soc. 221. Population and Society (3). Second semester. Staff.
- Soc. 224. Race and Culture (3). Second semester. Anderson.
- Soc. 241. Personality and Social Structure (3). Second semester. Melvin.
- Soc. 246. Public Opinion and Propaganda (3). Second semesters. Motz.
- Soc. 253. Advanced Criminology (3). First semester. Lejins.
- Soc. 254. Seminar: Criminology (3). Second semester. Lejins.
- Soc. 255. Seminar: Juvenile Delinquency (3). First semester. Lejins.
- Soc. 256. Crime and Delinquency as a Community Problem (3). Second semester. Lejins.
- Soc. 257. Social Change and Social Policy (3). First semester. Staff.
- Soc. 262. Family Studies (3). Second semester. Shankweiler.
- Soc. 282. Sociological Methodology (3). Second semester. Staff.
- Soc. 285. Seminar: Sociological Theory (3). First semester. Schmidt.
- Soc. 290. Research in Sociology. Credit to be determined. Staff.
- Soc. 291. Special Social Problems. First and second semester. Credit to be determined. Staff.

SPEECH AND DRAMATIC ART

Associate Professors Ansberry, Strausbaugh; Assistant Professors Provensen, Niemeyer, Batka, Hendricks, Linkow; Instructors Mayer, Coppinger, Pugliese, Starcher, Meeker, Benter, Potter, Gillis; Jr. Instructor Works. Forest Glenn Staff: Glorig, Senft, Hayes, Shutts, Bartlett.

The Department offers work leading to the Master of Arts degree in the field of Speech Pathology and Correction.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Speech 101. Radio Speech (3).** First semester. Prerequisite, Speech 4, Laboratory fee, \$2.00. Batka.
- Speech 102. Radio Production (3).** Second semester. Prerequisite, consent of instructor. Laboratory fee, \$2.00. Batka.
- Speech 103, 104. Speech Composition and Rhetoric (3, 3).** First and second semesters. Staff.
- Speech 105. Pathology (3).** Second semester. Prerequisite, Speech 112. Ansberry.
- Speech 106. Clinic (3).** Second semester. Prerequisites, Speech 105, 120. Ansberry.
- Speech 107. Advanced Oral Interpretation (3).** Second semester. Prerequisite, Speech 13. Provenson.
- Speech 110. Teacher Problems in Speech (3).** Second semester. For students who intend to teach. Hendricks.
- Speech 111. Seminar (3).** Second semester. Strausbaugh.
- Speech 112. Phonetics (3).** First semester. Ansberry.
- Speech 113. Play Production (3).** Second semester. Pugliese.
- Speech 114. Costuming (3).** First semester. One lecture and two laboratories a week. Meeker.
- Speech 115. Radio in Retailing (3).** First semester. Prerequisites, Speech 1, 2; English 1, 2. Laboratory fee, \$2.00. Batka.
- Speech 116. Radio Announcing (3).** Second semester. Prerequisite, Speech 101. Laboratory fee, \$2.00. Batka.
- Speech 117. Radio Continuity Writing (3).** First semester. Admission by consent of instructor. Coppinger.
- Speech 118. Advanced Radio Writing (3).** Second semester. Prerequisites, Speech 117 and consent of instructor. Coppinger.

- Speech 119. Radio Acting (3). Second semester. Admission by consent of the instructor. Coppinger.
- Speech 120. Speech Pathology (3). First semester. Prerequisite, Speech 105. A continuation of Speech 105. Ansberry.
- Speech 121. Stage Design (3). Second semester. Prerequisites, Speech 14, 15, and consent of the instructor. Meeker.
- Speech 122, 123. Radio Workshop (3, 3). First and second semesters. Admission by consent of instructor. Laboratory fee, \$2.00. Batka.
- Speech 126. Semantic Aspects of Speech Behavior (3). Second semester. Hendricks.
- Speech 131. History of the Theatre (3). First semester. Niemeyer.
- Speech 132. History of the Theatre (3). Second semester. Niemeyer.
- Speech 133. Staff Reports, Briefings, and Visual Aids (3). Second semester. Limited to the students in the College of Military Science. Prerequisites, Speech 5 and 6. Lecture and laboratory course dealing with the techniques used in military briefings, staff reports and the use of visual aids. Linkow.
- Speech 134. Intelligibility and Voice Communication In the Armed Forces (3). Limited to students in the College of Military Science and Tactics. An analysis of factors involved and practice in the delivery of military messages under varying conditions of transmission. Linkow.
- Speech 135. Introduction to Audiology (3). Second semester. Study of the basic problems of deafness among children and adults. Ansberry.

FOR GRADUATES

The Department maintains a reciprocal agreement with Walter Reed General Hospital whereby clinical practice may be obtained at the Army Audiology and Speech Correction Center, Forest Glen, Maryland.

- Speech 200. Thesis (3-6). Credit in proportion to work done and results accomplished. Ansberry.
- Speech 201. Special Problems (2-4). Arranged. Hendricks.
- Speech 210. Anatomy and Physiology of Speech and Hearing (3). Glorig.
- Speech 211. Advanced Clinical Practice (3). Glorig.
- Speech 212. Advanced Speech Pathology (3). Senft.
- Speech 213. Speech Problems of the Hard of Hearing (3). Senft.
- Speech 214. Clinical Audiometry (3). Hayes.
- Speech 215. Auditory Training (3). Shutts.

- Speech 216. Speech Reading (3). Bartlett.
Speech 217. Clinical Practice in the Selection of Prosthetic Appliances (3). Hayes and Staff.
Speech 218. Problems of Hearing and Deafness (3). Cornell.

VETERINARY SCIENCE

Professors Brueckner, DeVolt, Poelma, Reagan; Associate Professor Sperry
FOR GRADUATES AND ADVANCED UNDERGRADUATES

- V. S. 101. Comparative Anatomy (3). Two lectures and one laboratory period a week, first semester. Sperry.
V. S. 102. Animal Hygiene (3). Two lectures and one laboratory period a week, second semester. Sperry.
V. S. 103. Regional Comparative Anatomy (3). One lecture and one laboratory period a week, first semester. Sperry.
V. S. 104. Advanced Regional Comparative Anatomy (2). Two laboratory periods a week, second semester. Sperry.
V. S. 107. Poultry Hygiene (3). Two lectures and one laboratory period a week, second semester. DeVolt.
V. S. 108. Avian Anatomy (3). Two lectures and one laboratory period a week, first semester. DeVolt.

FOR GRADUATES

- V. S. 201. Animal Disease Problems (2-6). Arranged Poelma, DeVolt, Brueckner.
V. S. 202. Animal Disease Research. Arranged Poelma, DeVolt, Brueckner.
V. S. 203. Electron Microscopy (2). One lecture and one laboratory period a week, first semester. Reagan, Brueckner.

ZOOLOGY

Professors Phillips, Burhoe; Lecturers King, Reynolds; Associate Professors Littleford, Anastos; Instructors Allen, Grollman, Kreider, Stringer.

The Department of Zoology offers work leading to the Master of Science and the Doctor of Philosophy degrees. The general academic requirements which must be fulfilled for these degrees are described earlier in the catalog.

The special fields which graduate students may emphasize in working toward these degrees are embryology, fisheries biology, genetics, marine zoology, microscopic anatomy, parasitology, and physiology. Information concerning the specific requirements in each of these fields may be obtained from the department.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Zool. 101. **Mammalian Anatomy** (3). Three three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisite, permission of instructor. Stringer.
- Zool. 102. **General Animal Physiology** (4). Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisites, one year of zoology and one year of chemistry. Grollman.
- Zool. 104. **Genetics** (3). Three lecture periods a week, first semester. Prerequisite, one course in zoology or botany. Burhoe.
- Zool. 108. **Animal Histology** (4). Two lecture and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, one year of zoology. Stringer.
- Zool. 110. **Parasitology** (4). Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, one year of zoology. Anastos.
- Zool. 116. **Protozoology** (3). Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Prerequisites, histology; bacteriology desirable. Anastos.
- Zool. 118. **Invertebrate Zoology** (4). Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisites, one year of zoology. Allen.
- Zool. 121. **Principles of Animal Ecology** (3). Two lectures and one three-hour laboratory period a week, second semester. Laboratory fee, \$8.00. Prerequisites, one year of zoology and one year of chemistry. Allen.
- Zool. 125, 126. **Fishery Biology and Management** (3, 3). Two lectures and one three-hour laboratory period a week, first and second semesters. Prerequisite, permission of instructor. Laboratory fee, in zool. 125, \$8.00. Allen.
- Zool. 127. **Icthyology** (3). First semester. One lecture and two three-hour laboratory periods a week. Prerequisite, Zool. 5 and 20. Littleford.
- Zool. 130. **Aviation Physiology** (3). Three lectures a week, second semester. Prerequisite, one course in physiology and permission of the instructor. Reynolds.
- Zool. 132. **Applied Physiology** (3). Three lectures a week, first semester. Prerequisite, one course in physiology and permission of the instructor. King.
- Zool. 181. **Animal Behavior** (3). (Same as Psych. 181.) Second semester. Three lectures a week. Prerequisite, permission of instructor. Ross.

FOR GRADUATES

- Zool. 200. **Marine Zoology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Allen.
- Zool. 201. **Microscopical Anatomy (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory Fee, \$8.00. (—)
- Zool. 202. **Animal Cytology (4).** Two lecture and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. (—.)
- Zool. 203. **Advanced Embryology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Burhoe.
- Zool. 204. **Advanced Animal Physiology (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Phillips.
- Zool. 205. **Hydrobiology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Laboratory fee, \$8.00. Littleford.
- Zool. 206. **Research.** Credit to be arranged. First and second semesters. Laboratory fee, \$8.00. Staff.
- Zool. 207. **Zoology Seminar (1).** One lecture a week, first and second semesters. Staff.
- Zool. 208. **Special Problems in General Physiology.** Hours and credits arranged. Second semester. Laboratory fee, \$8.00. Phillips.
- Zool. 215. **Fishery Technology (4).** Two lectures and two three-hour laboratory periods a week, second semester. Prerequisite, consent of instructor. Littleford.
- Zool. 220. **Advanced Genetics (4).** Two lectures and two three-hour laboratory periods a week, first semester. Laboratory fee, \$8.00. Prerequisite, Zool. 104. Burhoe.

SCHOOL OF DENTISTRY

ANATOMY

Professor Hahn; Associate Professor Thompson; Instructor Hewes.

- Anatomy 111. Human Gross Anatomy (8).** Two lectures and two laboratory periods per week throughout the year. Hahn, Thompson, Hewes.
- Anatomy 113. Human Neuroanatomy (2).** Two lectures and two laboratory periods for eight weeks. Hahn, Thompson, Hewes.

FOR GRADUATES

- Anatomy 211. Human Gross Anatomy.** Credits to be arranged. Same as course 111 but with additional instruction. Hahn, Thompson.

Anatomy 213. Human Neuroanatomy. Credits to be arranged. Same as course 113 but with additional instruction. Hahn, Thompson.

Anatomy 214. The Anatomy of the Head and Neck (3). One lecture and two laboratory periods with conferences per week for one semester. Hahn, Thompson.

Anatomy 216. Research. Time and credit by arrangement. Staff.

BACTERIOLOGY

See Bacteriology Courses listed under "School of Pharmacy."

BIOCHEMISTRY

Professor Vanden Bosche; Instructor Edberg.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Biochemistry 111. Principles of Biochemistry (6). Two lectures, one conference and one laboratory period per week through the year.

Vanden Bosche, Edberg.

FOR GRADUATES

Biochemistry 211. Advanced Biochemistry. Time and credits by arrangement. Vanden Bosche, Edberg.

Biochemistry 212. Research in Biochemistry. Time and credits by arrangement. Prerequisite, 211.

HISTOLOGY AND EMBRYOLOGY

Professor McCrea; Instructor Cooksey.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Histology. 112. Mammalian Histology and Embryology (6). Two lectures and two laboratory periods per week throughout the year. McCrea, Cooksey.

FOR GRADUATES

Histology 212. Mammalian Histology and Embryology. Number of credits by arrangement. Same as course 112 but with additional instruction and collateral reading of a more advanced nature. McCrea.

Histology 213. Mammalian Oral Histology and Embryology. Number of credits by arrangement. McCrea.

Research in Histology 214. Number of hours and credit by arrangement. Prerequisite, 112 or 212. Staff.

Research in Embryology 215. Number of hours and credit by arrangement. Prerequisites by arrangement. Staff.

ORAL PATHOLOGY

Professor, M. S. Aisenberg; Instructor, A. D. Aisenberg.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Oral Path. 111. General Pathology (4). Two lectures and two laboratory periods per week for one semester. Aisenberg.

FOR GRADUATES

Oral Path. 211. Advanced Oral Pathology (8). Two lectures and two laboratory periods throughout the year. Aisenberg.

Oral Path. 212. Research. Time and credits by arrangement. M. S. Aisenberg.

ORAL SURGERY

Professor Dorsey; Assistant Professor Cappuccio; Instructors Londeree, Bushey, Hinrichs.

FOR GRADUATES

Oral Surgery 220. General Dental Oral Surgery (4). Two lectures and two laboratory periods per week for one semester. Dorsey and Staff.

Oral Surgery 221. Advanced Oral Surgery (4). Two lectures and two laboratory periods per week for one semester. Dorsey and Staff.

Oral Surgery 222. Research. Time and credit by arrangement. Staff.

PHYSIOLOGY

Professor Oster; Instructors Shipley, Pollack.

This Department offers work leading toward the degree of Master of Science. The general requirements for this degree are set forth in the section of this catalog entitled "Requirements for the Degree of Master of Arts and Master of Science."

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Physiology 111. Principles of Physiology (6). Sixty-six lectures and seventy-two hours of laboratory work throughout the year. For details of scheduling, consult the Dental School catalog. Oster, Shipley, Pollack.

FOR GRADUATES

Physiology 211. Principles of Mammalian Physiology. Credits to be arranged. Same as course 111 but with additional instruction and collateral reading. Oster, Shipley, Pollack.

Physiology 212. Advanced Physiology. Lecture and seminar during the second semester. Hours and credit by arrangement. Oster, Shipley, Pollack.

Physiology 213. Research. Credit and hours by arrangement.

Oster, Shipley, Pollack.

SCHOOL OF MEDICINE***ANATOMY****A. Gross Anatomy**

Professor Uhlenhuth; Associate Professor Krahl; Assistant Professor Mech;
Instructors Hunter, McCafferty, Wadsworth.

The graduate degrees offered by the Department of Gross Anatomy are the Master of Science and the Doctor of Philosophy.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Anat. 101. Human Gross Anatomy (8). Total number of hours approximately 350. Four conferences and lectures, 18 laboratory hours per week throughout the first semester. Laboratory fee, \$15.00.

Uhlenhuth, Krahl, Mech, Hunter, McCafferty, Wadsworth.

Anat. 102. Osteology of the Human Skull (1). One period of one hour once a week, for 10 weeks; Wednesday from 1 to 2 p. m., from September to December, inclusive. Uhlenhuth.

Anat. 103. The Peripheral Nervous System (1). One period of two hours once a week, for 10 weeks; Saturdays from 9 to 11 a. m., during the first semester. Uhlenhuth.

FOR GRADUATES

Anat. 201. General Anatomy of the Human Body (8). Same course as 101, but on a more advanced level. It can be taken by graduates as well as post-graduate students. Laboratory fee, \$15.00. Uhlenhuth, Krahl.

Anat. 202. Osteology of the Human Skull (1). Same course as 102, but on a more advanced level. Uhlenhuth.

Anat. 203. The Peripheral Nervous System (1). Same course as 103, but on a more advanced level. Uhlenhuth.

Anat. 204. The Anatomy of the Human Pelvis (2). Total number of hours, 60; 15 periods of four hours each, every Tuesday morning from 9 a.m. to 1 p.m., for 15 weeks during the first semester. This course is open to graduate students and postgraduate students specializing in Gynecology, Obstetrics and Urology. Uhlenhuth.

Anat. 205. Fetal and Infant Anatomy (2). Total number of hours, 45; 15 periods of three hours each, every Thursday from 9 a.m. to 12 noon for 15 weeks during the second semester. This course is open to graduate students and postgraduates interested in pediatrics. Krahl.

*In the Departments of Anatomy, Bacteriology, Biochemistry, and Pharmacology, courses listed under "For Graduates and Advanced Undergraduates" and numbered with 100 are credited for work only when taken to satisfy credits in the minors.

Anat. 206. Research in Anatomy. Maximum credits, 12 per semester. Research work may be taken in any one of the branches which form the subject of anatomy and with either of the instructors listed below. Uhlenhuth, Krahl.

B. Histology, Embryology and Neuro-Anatomy

Professor Figge; Associate Professor Harne; Assistant Professor Lutz;
Assistant Wolfe; Research Associate Brunst

The graduate degrees offered by the Department of Histology, Embryology and Neuro-Anatomy are the Master of Science and the Doctor of Philosophy.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Hist. 101. Mammalian Histology (6). Total number of hours, 144. Four lectures and eight laboratory hours, four times a week for 12 weeks during the first semester. Laboratory fee, \$10.00.

Figge, Harne, Lutz, Wolfe, Brunst.

Hist. 102. Human Neuro-Anatomy (4). Total number of hours, 96. Two lectures and four laboratory hours per week for 16 weeks of the second semester of every medical school year. Prerequisite, Hist. 101, or equivalent. Laboratory fee, \$10.00.

Figge, Harne, Lutz, Wolfe.

FOR GRADUATES

Hist. 201. Mammalian Histology (6). Same Course as Hist. 101, but with additional work of a more advanced nature. Laboratory fee, \$10.00.

Figge.

Hist. 202. Human Neuro-Anatomy (4). Same course as Hist. 102, but with additional work of a more advanced nature. Prerequisite, Hist. 101 and 201. Laboratory fee, \$10.00.

Figge.

Hist. 203. Normal and Atypical Growth, Lectures in Problems of Growth (2). Two hours per week, time to be arranged. Sixteen weeks, second semester.

Figge.

Hist. 204. Research. Maximum credits, 12. Research work may be taken in any one of the branches which form the subject of anatomy (including cancer research).

Figge.

BACTERIOLOGY

Professor Hachtel; Associate Professor Steers; Assistant Professor Smith; Instructor Snyder; Associate Levin.

Graduate degrees offered by the Department of Bacteriology are Master of Science and Doctor of Philosophy.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Bact. 101. General Bacteriology (6). Two lectures and eight laboratory hours per week for sixteen weeks, first semester. Laboratory fee, \$10.00.

Hachtel, Steers, Smith, Snyder, Levin, Heinz.

Bact. 102. Immunology (4). One lecture and six laboratory hours per week, second semester. Laboratory fee, \$10.00.

Hachtel, Steers, Smith, Snyder, Levin, Heinz.

FOR GRADUATES

Bact. 201. General Bacteriology (6). Same course as Bact. 101, but with additional work at a more advanced level. Laboratory fee, \$10.00.

Hachtel, Steers.

Bact. 202. Immunology (4). Same course as Bact. 102, but with additional work at a more advanced level. Laboratory fee, \$10.00. Hachtel, Steers.

Bact. 203. Bacterial Physiology (3). Three lectures per week, but no laboratory, first semester. Steers.

Bact. 204. Research. Maximum credits, 12. Hachtel, Steers, Smith.

Bact. 205. Genetics of Microorganisms (1). One lecture per week, second semester. Steers.

BIOLOGICAL CHEMISTRY

Professor Schmidt; Associate Professor Herbst; Assistant Professor Vanderlinde; Lecturer Summerson; Instructor Brown.

Graduates degrees offered by the Department of Biological Chemistry are the Master of Science and Doctor of Philosophy.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Biochem. 101. Principles of Biochemistry (8). Seven lectures and conferences and two three-hour laboratory periods a week, second semester. Prerequisites, inorganic, organic and quantitative or physical chemistry. Laboratory fee, \$20.00. Schmidt, Herbst, Vanderlinde, Brown.

FOR GRADUATES

Biochem. 201. Principles of Biochemistry (8). Same course as Biochem. 101, but on a more advanced level for students majoring in biological chemistry. Laboratory fee, \$20.00. Schmidt, Herbst, Vanderlinde, Brown.

Biochem. 202. Special Topics in Biochemistry (1, 1). Prerequisite, Biochem. 101 or 201. Schmidt.

Biochem. 203. Research. Maximum credits, 12. Credit proportioned to extent and quality of work accomplished. Schmidt, Herbst, Vanderlinde.

Biochem. 204, 205. Seminar (1, 1). First and second semesters. Schmidt.

Biochem. 206, 207. Enzymes and Metabolism (1-3). First and second semesters. Herbst.

Biochem. 208. Biochemical Preparation (1-4). Credit according to work done. Schmidt.

Biochem. 209. Chemistry and Metabolic Effects of the Steroid Hormones (1-3). Vanderlinde.

FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

Instructors Summerson, Jandorf, Michel, Schaffer, Wagner-Jauregg.

Graduate degrees offered at the Army Chemical Center are the Master of Science and Doctor of Philosophy.

Biochem. 221, 223. Principles of Biochemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, undergraduate courses in inorganic, organic, and quantitative or physical chemistry. Summerson.

Biochem. 222, 224. Experimental Biochemistry (2, 2). One lecture and one three-hour laboratory period a week, first and second semesters. Prerequisite, Biochemistry 221 and 223, which may be taken concurrently, or equivalent preliminary training in biochemistry. Summerson, Jandorf, Michel, Schaffer.

Biochem. 225. Chemistry of Amino Acids and Proteins (2). Two lectures a week, first semester. Prerequisite, Biochemistry 221 and 223, or adequate undergraduate training in organic chemistry, with the consent of the instructor. Summerson.

Biochem. 226. Chemistry of Chemotherapeutic Compounds (1). One lecture a week, first semester. Prerequisite, adequate knowledge of organic chemistry. Wagner-Jauregg.

Biochem. 227. Enzyme Chemistry (2). Two lectures a week, second semester. Prerequisites, Biochemistry 225 (Protein Chemistry), or equivalent training in biochemistry, with consent of instructor. Jandorf.

Biochem. 228. Seminar (3). Summerson.

Biochem. 229. Research. Maximum credits, 12. Credit according to extent and quality of work accomplished. Summerson, Jandorf.

LEGAL MEDICINE

Professor Fisher, Associates Freimuth and Lovitt.

Leg. Med. 201. Legal Medicine (1). One hour of lecture for twelve weeks, 4 hours assigned reading, first semester. Fisher, Lovitt, Freimuth.

Leg. Med. 202. Toxicology (10). Two hours lecture, 8 laboratory hours per week for 1 year. Freimuth, Fisher.

Leg. Med. 203. Gross Pathologic Anatomy as Related to Toxicology (2). One hour lecture, 3 hours laboratory per week for one semester. Fisher, Lovitt.

Leg. Med. 204. Research in Toxicology leading to preparation of a Thesis for the M.S. (6). Minimum credits, six. Freimuth, Fisher.

Leg. Med. 205. Research in Toxicology leading to preparation of a Thesis for the Ph. D. (30). Fisher, Freimuth.

This Department offers schedules leading to the degrees of Master of Science and Doctor of Philosophy in Toxicology. Candidates are expected to have completed undergraduate work as follows: Eight semester hours each in general chemistry, organic chemistry, analytical chemistry (qualitative and quantitative), physical chemistry, physics, biology and four semester hours in organic qualitative analysis.

Candidates for the Master's Degree must complete the following courses:
Leg. Med. 201, 202, 203 and 204.

Pharm. 101, f. s. and Chem. 258.

Candidates for the doctorate must complete the following courses:

Leg. Med. 201, 202, 203, 205.

Pharm. 101, f.s., Physiol. 102, Bact. 101, Bact. 102, Biochem. 206, Chem. 206, 208, Chem. 221, 223, Chem. 258, Chem. 150, Pharm. Chem. 111, 113, Pharm. Chem. 112, 114.

Part of the above work is offered at College Park with the remainder to be done at the Baltimore Schools. Some of the course work in Legal Medicine and Toxicology will be given at the Laboratories of the Division of Legal Medicine located at the Office of the Chief Medical Examiner, 700 Fleet Street, Baltimore, Md.

PHARMACOLOGY

Professor Krantz; Professor Carr; Assistant Professor Burgison;
Instructor Musser; Lecturer Marrazzi.

All students majoring in pharmacology with a view to obtaining the degree of Master of Science or Doctor of Philosophy should secure special training in anatomy, mammalian physiology, organic chemistry, and physical chemistry.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Pharm. 101, f.s., General Pharmacology (8). Three lectures and one laboratory. This course consists of 90 lectures and 30 laboratory periods of three hours each, offered each year. Laboratory fee, \$20.00.

Krantz, Carr, Burgison, Musser, Bird, Marrazzi, Harne.

FOR GRADUATES

Pharm. 201, f.s., General Pharmacology (8). Same as 101, for students majoring in pharmacology. Additional instruction and collateral reading are required. Laboratory fee, \$20.00. Krantz, Carr, Burgison.

- Phar. 202. Chemotherapy.** Maximum credits, 3. Credit in accordance with the amount of work accomplished, first semester. Burgison.
- Pharm. 204. Carbohydrate Metabolism.** Maximum credits, 4. Credit in accordance with the amount of work accomplished. Krantz, Carr.
- Pharm. 205. Research.** Maximum credits, 12. Credit in accordance with the amount of work accomplished. Krantz, Carr.
- Pharm. 206. Anesthesia.** Maximum credits, 2. Credit in accordance with the work accomplished. Krantz, Carr.
- Pharm. 207, 208. Chemical Aspects of Pharmacodynamics (2-2).** Burgison.

FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

Instructors Marrazzi, Hart, Wills, Horton.

Graduate degrees offered at the Army Chemical Center are the Master of Science and Doctor of Philosophy.

Pharm. 220, 222. Principles of Pharmacology (3, 3). Three lectures a week, first and second semesters. Prerequisites, Biochemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 221 and 223 except by special arrangement with the instructor. Marrazzi, Hart, Wills.

Pharm. 221, 223. Experimental Pharmacology (1, 1). One three-hour laboratory period a week, first and second semesters. Prerequisites, Biochemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 220 and 222 except by special arrangement with the instructor. Marrazzi, Hart, Wills.

Pharm. 225. Biometric Principles and Their Application (1). One lecture a week, first semester. Horton, Wills.

Pharm. 226. Electropharmacology. Maximum credits, 2. Time to be arranged. Marrazzi, Hart.

Pharm. 228. Seminar (1). Hart, Wills.

Pharm. 229. Research. Maximum credits, 12. Marrazzi, Wills.

PHYSIOLOGY

Professors Amberson, Smith; Associate Professor Ferguson; Assistant Professor White; Lecturer Wills; Instructor Fox.

The Department prefers to accept students who have already had some graduate training elsewhere. Before admission to candidacy for the Doctor of Philosophy degree the Department gives a qualifying examination, both oral and written, which must be satisfactorily passed.

In the usual case a student majoring in Physiology will be expected to take

Physiol. 101 and 102 before, or concurrently with, courses 201 to 205 below. Such a student will extend his major program by taking courses in other departments of this University, and by enrolling in the summer course in physiology at the Marine Biological Laboratory, Woods Hole, Massachusetts.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Physiol. 101. Neurophysiology (2). Two lectures a week, for 15 weeks; second semester. Amberson, Fox.

Physiol. 102. The Principles of Physiology (7). Four lectures, one conference a week, for 15 weeks; 25 four-hour laboratory periods; first semester. Laboratory fee, \$15.00. Amberson and Staff.

FOR GRADUATES

Physiol. 201. Experimental Mammalian Physiology. Time and credit by arrangement. Amberson and Staff.

Physiol. 202. Blood and Tissue Proteins (2). Two lectures a week, for 15 weeks. Amberson and White.

Physiol. 203. Physiology of Reproduction (2). Two hours a week, lectures, conferences and seminars, for 15 weeks. Smith.

Physiol. 204. Physiological Techniques. Time and credit by arrangement. Amberson and Staff.

Physiol. 205. Physiology of Kidney and Body Fluids. (2). Ferguson.

Physiol. 205. Seminar. Credit according to work done. Staff.

Physiol. 206. Research. By arrangement with the head of the department. Staff.

FOR GRADUATES AT ARMY CHEMICAL CENTER, EDGEWOOD, MARYLAND

Physiol. 221, 223. Principles of Physiology (3, 3). Three lectures and conferences, first and second semesters. Prerequisites, Biochem. 221-4, or equivalent. Wills and Staff.

Physiol. 222, 224. Experimental Physiology (1, 1). One three-hour laboratory a week, first and second semesters. Prerequisites, Physiol. 221-3, which may be taken concurrently, or equivalent preliminary training in physiology. Wills and Staff.

Physiol. 225. Seminar (1). Wills and Staff.

Physiol. 226. Research. Maximum credits, 12. Credit according to extent and quality of work accomplished. Wills and Staff.

SCHOOL OF PHARMACY

Professors Cole, Estabrook, Foss, Hager, Ichniowski, Phillips, Purdum, Richeson, Shay, Slama, Wolf; Associate Professors Allen, Miller; Assistant Professor Ballman; Instructors Applegarth, Gittinger, Schradieck.

BACTERIOLOGY

This Department offers work leading toward the Master of Science and the Doctor of Philosophy degrees. Requirements for the doctoral degree are fulfilled by supplementing the courses offered in this Department with selected courses from the College Park curriculum.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Bact. 115. Serology and Immunology (4). Third year, two lectures and two laboratory periods a week, second semester. Shay, Merkel.

FOR GRADUATES

Bact. 200, 201. Chemotherapy (1-2). One lecture a week. Offered in alternate years. Shay.

Bact. 202, 203. Reagents and Media (1,). One lecture a week. Offered in alternate years. Shay.

Bact. 210. Special Problems in Bacteriology. Laboratory course. Credit determined by amount and quality of work performed. Shay.

Bact. 211. Public Health (1-2). One lecture a week. Prerequisites, Bacteriology 1, 115. Shay.

Bact. 221. Research in Bacteriology. Credit determined by amount and quality of work performed. Shay.

BIOCHEMISTRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Chem. 151. Biochemistry (5). Four lectures and conferences and one four-hour laboratory period a week, first semester. Prerequisites, Chem. 35, 36, 37, 38, 15. Schmidt and Staff.

BOTANY AND PHARMACOGNOSY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Bot. 101, 102. Taxonomy of the Higher Plants (2, 2). One lecture and one laboratory period a week. Prerequisites, Botany 1, 21. Given in alternate years. Slama.

Bot. 111, 113. Plant Anatomy (2, 2). Two lectures a week. Prerequisites, Bot. 1, 21, 22. Slama.

Bot. 112, 114. Plant Anatomy (2, 2). Two laboratory periods a week. Prerequisites, Bot. 111, 113. Slama.

FOR GRADUATES

Pharmacognosy 201, 202. Advanced Study of Vegetable Powders (4, 4). Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Given in alternate years. Slama.

Pharmacognosy 211, 212. Advanced Pharmacognosy (4, 4). Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Slama.

Pharmacognosy 220. Research. Credit according to amount and quality of work performed. Slama.

MATHEMATICS

Math. 152, 153. Mathematical Statistics (2, 2). Prerequisites, Math. 20, 21. Richeson.

PHARMACEUTICAL CHEMISTRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Pharm. Chem. 111, 113. Chemistry of Medicinal Products (2, 2). Two lectures a week, first and second semesters. Prerequisites, Chem. 35, 37, 53. Hager.

Pharm. Chem. 112, 114. Chemistry of Medicinal Products (2, 2). Two laboratory periods a week, either or both semesters. Prerequisites, Pharm. Chem. 111, 113, or may be taken simultaneously with Pharm. Chem. 111, 113. Hager.

Chem. 142, 144. Advanced Organic Laboratory (2, 2). Two laboratory periods a week, any one or both semesters. Prerequisites, Chem. 19 or 23, and Cem. 37, 38. Miller.

Chem. 146, 148. Identification of Organic Compounds (2, 2). One lecture and two laboratory periods a week, any one or both semesters. Prerequisites, Pharm. Chem. 111, 113, or Chem. 141, 143. Miller.

FOR GRADUATES

Pharm. Chem. 201, 203. Survey of Pharmaceutical Chemistry (2, 2). Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Hager.

Pharm. Chem. 211, 213. Chemistry of the Alkaloids (2, 2). Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Hager.

Parm. Chem. 220. Advanced Pharmaceutical Syntheses (2-6). Laboratory and conferences, either or both semesters. Prerequisites, Chem. 142, 144, or Pharm. Chem. 112, 114. Hager.

Pharm. Chem. 222. Advanced Pharmaceutical Analyses (1-4). Laboratory and conferences, either or both semesters. Prerequisites, Chem. 146, 148. Hager.

Pharm. Chem. 230. Pharmaceutical Chemistry Seminar (1). Required of students majoring in pharmaceutical chemistry each semester. Hager.

Pharm. Chem. 235. Research in Pharmaceutical Chemistry. Credit determined by amount and quality of work performed. Hager, Miller.

Chem. 258. The Identification of Organic Compounds. An advanced course. Two to four laboratory periods a week, either semester. Prerequisites, Chem. 146, 148, or equivalent.

PHARMACOLOGY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Pharmacology 111. Official Methods of Biological Assay (4). Two lectures and two laboratory periods a week, first semester. Prerequisite, Pharmacology 81, 82. Ichniowski.

FOR GRADUATES

Pharmacology 201, 202. Methods in Biological Assay (4,). Two lectures and two laboratory periods a week, first and second semesters. Prerequisite, Pharmacology 111. Offered in alternate years. Ichniowski.

Pharmacology 211, 212. Special Studies in Pharmacodynamics (4, 4). Two lectures and two laboratory periods a week, first and second semesters. Prerequisite, Pharmacology 81 and 82 and the approval of the instructor. Ichniowski.

Pharmacology 221, 222. Special Studies in Biological Assay Methods (2-4, 2-4). Credit according to amount of work undertaken after consultation with the instructor. Laboratory work and conferences, first and second semesters. Prerequisites, Pharmacology 111, 201, 202. Offered in alternate years. Ichniowski.

Pharmacology 250. Research in Pharmacology. Properly qualified students may arrange semester hours' credit with the instructor. Ichniowski.

PHARMACY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

Pharmacy 101, 102. Manufacturing Pharmacy (1, 1). One lecture and one laboratory a week. Prerequisites, Pharmacy 51, 52, 53, 54. Allen and Staff.

Pharmacy 111, 112. Advanced Prescription Compounding (2, 2). One lecture and one laboratory a week. Prerequisites, Pharmacy 51, 52, 53, 54. Allen and Staff.

Pharmacy 120. Hospital Management (2). Two lectures a week. Prerequisites. Pharmacy 51, 52. Purdum.

FOR GRADUATES

- Pharmacy 201, 202. Advanced Pharmaceutical Technology (4, 4).** Two lectures and two laboratory periods a week. Prerequisites, Pharmacy 101, 102.
Foss, Purdum, Allen.
- Pharmacy 205. Manufacturing Pharmacy Control (3).** Three lectures a week.
Prerequisites, Pharmacy 111, 112.
Foss.
- Pharmacy 211, 212. Survey of Pharmaceutical Literature (1, 1).** One lecture a week. Prerequisites, Pharmacy 51, 52, 53, 54 and 61.
Allen, Purdum.
- Pharmacy 215, 216. Pharmaceutical Formula Problems (2, 2).** Prerequisites, Pharmacy 111, 112.
Allen.
- Pharmacy 221, 222. History of Pharmacy (2, 2).** Two lectures a week. Given in alternate years. Prerequisite, Pharmacy 61.
Allen, Purdum.
- Pharmacy 230. Pharmacy Seminar (1).** Each semester.
Allen.
- Pharmacy 235. Research in Pharmacy.** Credit and hours to be arranged.
Foss, Purdum, Allen.

PHYSICS AND PHYSICAL CHEMISTRY

FOR GRADUATES AND ADVANCED UNDERGRADUATES

- Chem. 187, 189. Physical Chemistry (3, 3).** Three lectures a week, first and second semesters. Prerequisites, Phys. 11; Chem. 15, 35, 37.
Estabrook.
- Chem. 188, 190. Physical Chemistry (2, 2).** Two laboratory periods a week, first and second semesters. Prerequisite, Chem. 187, 189, or may be taken simultaneously with these courses.
Estabrook.
- Phys. 104, 105. Electricity and Magnetism (3, 3).** Two lectures and one laboratory period a week, first and second semesters. Given in alternate years.
Prerequisites, Phys. 11; Math. 21.
Estabrook.
- Phys. 112, 113. Modern Physics (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Phys. Chem. 187, 189, 188, 190. Given according to demand.
Estabrook.

FOR GRADUATES

- Phys. 200, 201. Introduction to Theoretical Physics (5, 5).** Five lectures a week, first and second semesters. Given according to demand.
Estabrook.
- Phys. 208, 209. Thermodynamics (2, 2).** Two lectures a week, first and second semesters. Prerequisites, Phys. Chem. 187, 188, 189, 190. Given in alternate years.
Estabrook.

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SEPARATE CATALOGS

At College Park

Individual catalogs of colleges and schools of the University of Maryland at College Park may be obtained by addressing the Director of Publications, University of Maryland, College Park, Maryland.

These catalogs and schools are:

1. General Information
2. College of Agriculture
3. College of Arts and Sciences
4. College of Business and Public Administration
5. College of Education
6. Glenn L. Martin College of Engineering and Aeronautical Sciences
7. College of Home Economics
8. College of Military Science
9. College of Physical Education, Recreation and Health
10. College of Special and Continuation Studies
11. Summer School
12. Graduate School

At Baltimore

Individual catalogs for the professional schools of the University of Maryland may be obtained by addressing the Deans of the respective schools at the University of Maryland, Lombard and Greene Streets, Baltimore 1, Maryland. These professional schools are:

13. School of Dentistry
14. School of Law
15. School of Medicine
16. School of Pharmacy
17. School of Nursing

At Heidelberg

The catalog of the European Program may be obtained by addressing the Dean, College of Special and Continuation Studies, College Park, Maryland.

